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CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

JANUARY 15, 1999

SECTION ONE
130 PAGES IN TWO SECTIONS

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On the Road

How to serve a mobile workforce without crashing your budget

PAGE 36

David McCue, CIO at CSC Healthcare in New York City, wants workers to feel safe and supported—no matter where they are

ALSO INSIDE

A CIOs' Wish List

PAGE 42

Winning the Data Warehouse Wars

PAGE 48

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CIO

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SECTION 1

Features

36 **The Road Rage**
COVER STORY: THE MOBILE WORKFORCE Road warriors are a growing breed, and that means IT's headaches are on the rise. To support mobile workers successfully, IT must often take a whole new approach.
By Mindy Blodgett

42 **What Dreams May Come**
CIO PRIORITIES Ever wonder what CIOs would wish for if given the chance? We did, and we learned that in some cases dreams can come true. *By Tracy Mayor*

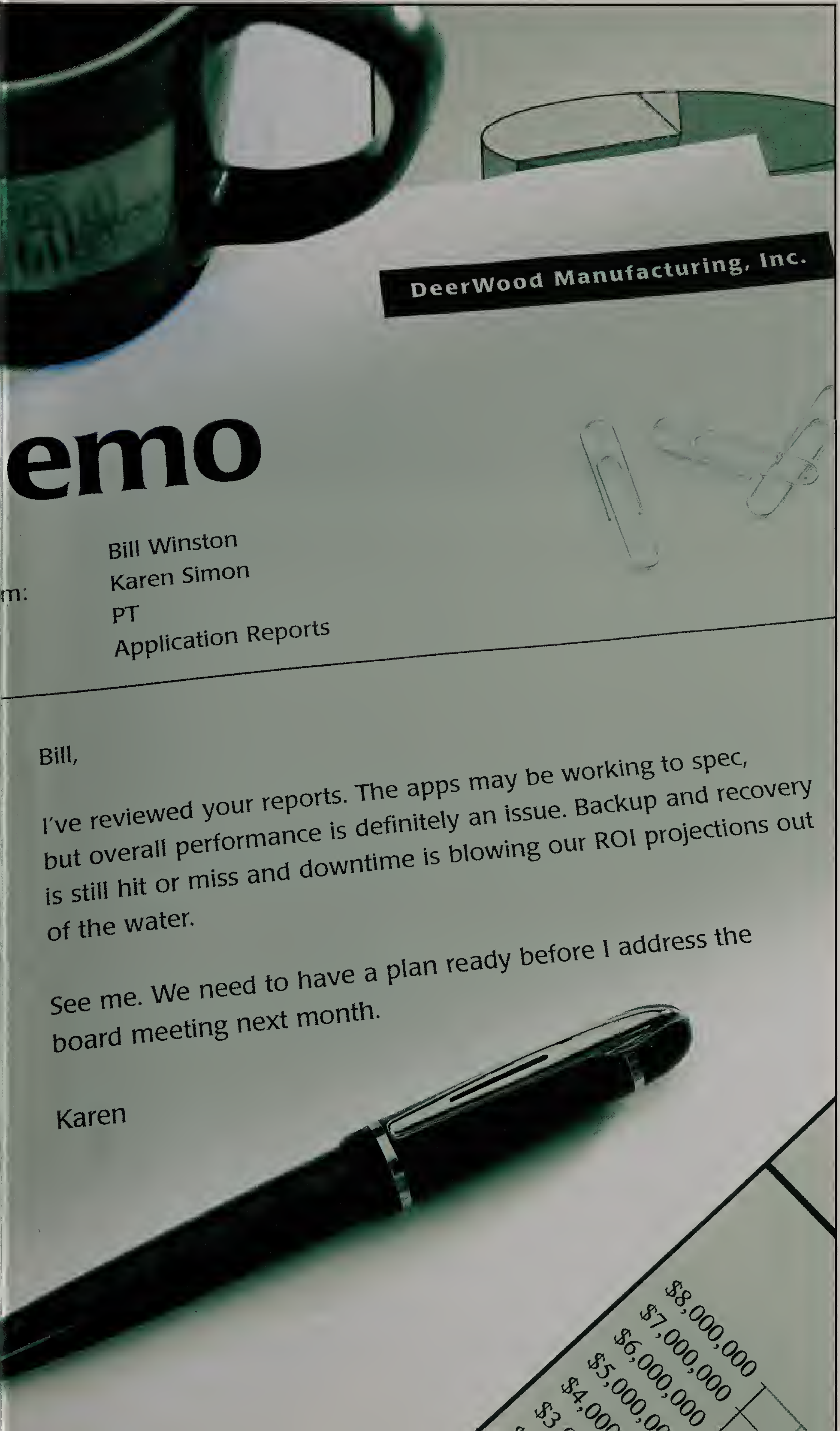
48 **The Middle Ground**
DATA WAREHOUSE Will dependent data marts strike a balance between huge data warehouse rollouts and piecemeal data mart implementations?
By Christopher Koch

ON THE COVER

David McCue makes sure his mobile users can work anywhere they want—even Times Square.

Cover photo by John Rae

Looking for maximum ROI fast?



emo

m:

Bill Winston
Karen Simon
PT
Application Reports

Bill,

I've reviewed your reports. The apps may be working to spec, but overall performance is definitely an issue. Backup and recovery is still hit or miss and downtime is blowing our ROI projections out of the water.

See me. We need to have a plan ready before I address the board meeting next month.

Karen

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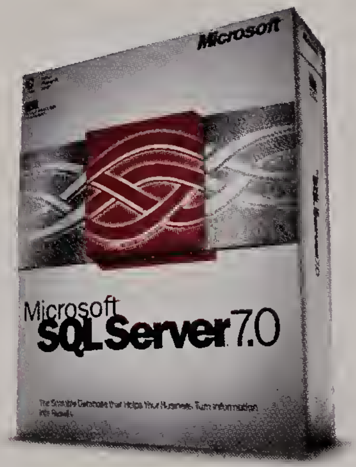

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CIO

Columns

30 Align Drive

EXPERT ADVICE For most CIOs, aligning IT with the business is one of the hardest parts of the job. But with the help of a logical, repeatable process, it can be a whole lot easier. *By Craig Goldman*

56 Making Expenses Less Expensive

EMERGING TECHNOLOGY Expense management packages can turn administrative pain into financial gain. *By Bill Roberts*
Quantum computers • Testing Web applications • Palm talk • Call center scheduling • Euro conversion

64 WearGuard's Sales-Force Automation System

WORKING SMART Automated tools enhance the customer service capabilities of the business sales group and will enable more targeted selling in the near future. *By Kim Girard*

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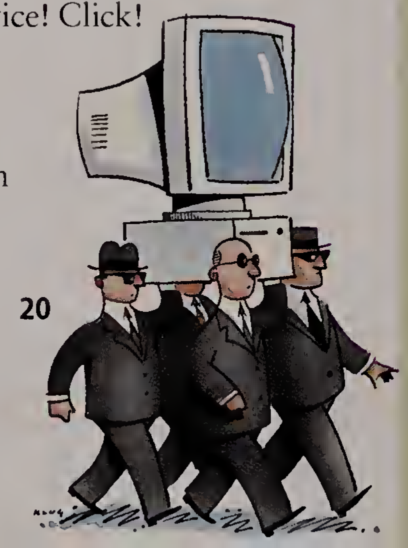

CIO Enterprise
SECTION
Sharp Lookouts
Shrewd tactics for finding and feasting on strategic business information

Inside Section 2

COVER STORY: KNOWLEDGE MANAGEMENT An executive's search for strategic information requires an arsenal of tactics.

PROCESS REDESIGN So you think 99 percent accuracy in your business processes cuts the mustard? Proponents of Six Sigma say think again.

CORPORATE CULTURE If you don't invest in corporate culture, you could be short-changing your bottom line.

INTERVIEW: AHMAD KAMAL Pakistan's Ambassador is leading the United Nations' charge against Y2K.

REALITY BYTES Nurture workers' souls without the pricey gurus.

HANDSHAKE Some British companies think sharing marketing data will help them find elusive links among chocolate-eaters, perfume-wearers and diaper-buyers.

LEARNING CURVE Push technology brings you the Web stuff you want and filters out the rest.

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In Box

LETTER FROM THE EDITOR, READER FEEDBACK AND HOW TO REACH US

For most of my life, I've entered the New Year with a sense of anticipation—having a clean slate, a fresh start. Even in the midst of large and complicated projects or momentous developments in my personal life, on Jan. 1 it's as if I get a delivery from the psychic energy corps. I feel like Popeye after a good dose of spinach. Things that just a few weeks before seemed huge and overwhelming are now well within my grasp.

PHOTO BY WEBB CHAPPELL

This year is likely to be one of the most challenging in my lifetime. I have no doubt it will be one of the most memorable. When my grandchildren ask me about the turn of the millennium, it will be 1999 that comes most vividly to mind, not 2000 itself. The buildup to *next* Jan. 1, especially (but by no means exclusively) in CIO circles, is going to be tremendous.

I'm psyched.

And frankly, I'm surprised at my attitude. If you read my Nov. 1 letter, you know that just a few short months ago I was feeling more than a little pessimistic about the whole Y2K thing. Don't get me wrong—I'm still concerned. I still think there are way too many companies and government entities out there that aren't doing enough to fix things. But today my New Year's mind-set is telling me, "Hey! We still have a whole year to whip this thing! We can do it!"

New Year's is also a time for making lists. One list that has come across my desk recently is the 11th annual CSC survey of top IS issues. According to the survey, "using information technology for competitive advantage" plummeted from the number 3 position to number 10 in 1998, yet "aligning IS and corporate goals" still reigns supreme at number 1. This combination would make sense only in a competition-free business environment. While Bill Gates may argue that's where we're headed, we're certainly not there yet. So what does this mean? Obviously, IS executives are preoccupied with Y2K and the staffing crisis. However, I know some CIOs who are leveraging their Y2K dollars as strategic investments, not only fixing old code but replacing tired systems with newer, more flexible technology that will put their organizations in a stronger competitive position. I suspect that those who aren't will be a lot more concerned (like, terrified out of their wits) about the competitive issues next year or the year after.

These survey results may reflect a general retrenching and rebuilding within IS, brought on by Y2K and the transformation to a networked economy and exacerbated by a shortage of technical talent. Perhaps the numbers are skewed by the fact that less than 30 percent of respondents are at the CIO/VP level. I sure hope so. Otherwise, the prospects for an energized January 2000 aren't looking good.

For now, I'm still optimistic about what this year can bring. Here's to a great 1999 for you and your staffs from all of us at *CIO*.

Abbie Lundberg

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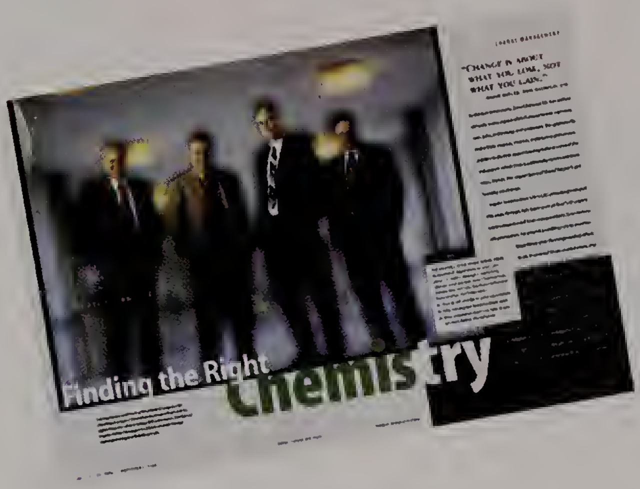

IT'S ELEMENTARY

I read your article on change at The Dow Chemical Co. ["Finding the Right Chemistry," *CIO* Section 1, Nov. 1, 1998]. Very good! It captured what I think are the essential elements of change management: sponsorship (read leadership), communication and dealing with resistance by using humor and other means.

I was especially interested in comments about consensus and the role it plays in change. It is a fine line to walk, spending time getting input (which can have more physiological benefit to the performers than actual benefit to the solution design) versus telling people what is going to change. I lean toward spending time, but that's me. You covered a lot of ground in one article.

Loy Allen
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COVER SHOT

I am not sure that I understand the self-satisfied smirk on the face of John Thomas Flynn on your Nov. 15 cover [*CIO* Section 1].

Is it because he gets to say no? It looks as if someone spent a lot of time and effort putting together the IT proposal he so gleefully (and callously) rejects. I certainly would not want to work for an individual who derived pleasure from "dissing" someone's hard work in that manner.

Phil Kriley
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Allegheny Ludlum Corp.
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PKriley@AlleghenyLudlum.com

HIGH SCORES

I'm the founder of a company that is focused on delivering Web-based software solutions to help IT organizations measure, manage and demonstrate their contribution to the company's bottom line. I have read most of the reports from GartnerGroup, Harvard Business School and Forrester Research on balanced scorecards and measuring IT, and I want to tell you that your article ["Score It a Hit," *CIO* Section 2, Nov. 15, 1998] is by far the best. Your article articulates why we have designed our solutions the way they are: repeatable, automated, simple and logical in what they measure by default and designed with the assumption that most customers will want configure measurements to match their unique organizations and strategies.

John Johnson
President and Founder
Enterprise Value Inc.
San Jose, Calif.
valueit@thegrid.net

CORRECTION

We listed an incorrect telephone number for Kennedy Information Research Group [Plugged In, *CIO* Section 2, Oct. 15, 1998]. The correct telephone number is 603 585-3101.

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Publisher's Note

One aspect of Y2K is indisputable. No one knows for sure what will happen next year when the digital rollover strikes.

Check out the SEC-mandated Y2K quarterly filings from public companies and search in Y2K-compliance areas of vendor Web sites. The truth is ugly. Corporations are throwing away money in desperate efforts to "fix" their Y2K problems. But money alone won't buy you happiness, and it won't buy you a Y2K fix. Beware IT vendors that run Y2K legal mumbo jumbo on their Web sites.

The bottom line is that CIOs around the world are going to face this digital tsunami alone. But there is an exception: CIOs who buy all their hardware, software and networking products from one company will be fine. (Aha! Maybe monopolies are good for the industry!)

Here are a few explanations from major vendors on how Y2K compliant their products are.

"A Y2K compliant product from Microsoft will not produce errors processing date data...provided all other products used with it properly exchange date data with the Microsoft product" *–Microsoft Corp.*

"3Com products will continue to perform properly on and after Jan. 1, 2000, provided that all other products used by the customer in connection or combination with the 3Com product, including hardware, software and firmware, accurately exchange date data with the 3Com product." *–3Com Corp.*

"Telecommunications companies will not be able to declare their systems compliant until switch manufacturers have completed their compliance programs." *–MCIWorldCom Inc.*

Do you feel alone yet?

Thirty years ago my dad gave me an important piece of advice: Always be true to yourself. I pass the advice along to every reader who is readying infrastructure for Y2K.

Now is the time to deliver a frank appraisal to your CEO of what you expect to happen to your company's business operations on Jan. 1, 2000. The Beach/Oleson Pain Index for Y2K issues, at *www.cio.com/y2kchart.html*, can help you appraise your readiness.

Be honest with your executive colleagues. Be prudent. Don't compromise and don't overpromise. If the executive committee rants and raves and threatens to replace you with someone who will give a more optimistic assessment, dare them to do it.

Be true to yourself.

Gary J. Beach

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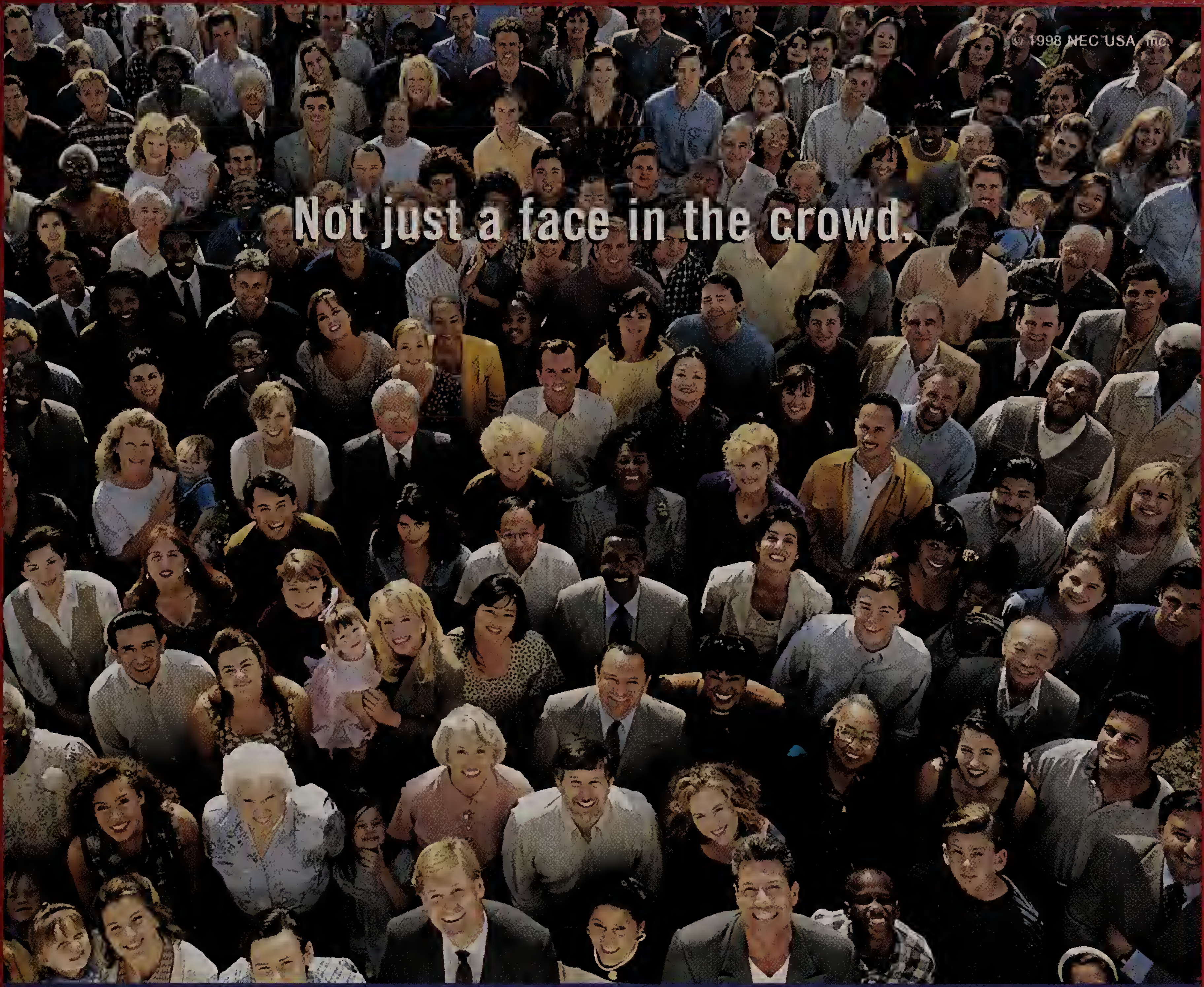

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Trendlines

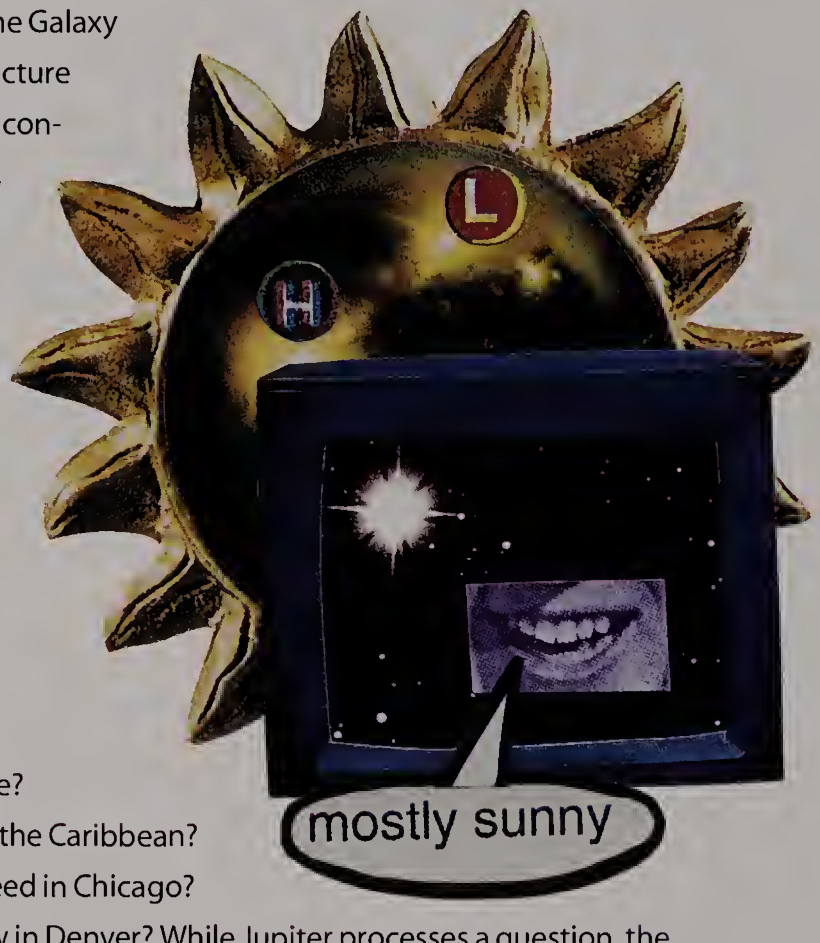
NEWS, INSIGHT, HUMOR, REVIEWS

Edited by Katherine Noyes

Making Small Talk

CHATTY COMPUTER Until recently, one of the consoling things about computers has been that they couldn't talk back. No matter what you dished out, they'd just sit there and take it with nary a word of complaint. It's time to bid those days goodbye. A computer run by the Spoken Language Systems (SLS) group in MIT's Laboratory for Computer Science based in Cambridge, Mass., is designed to talk back—specifically, to listen and respond to questions about the weather, posed by people who call it on the phone.

Named Jupiter, the computer can answer questions about weather forecasts for more than 500 cities worldwide, including temperature, wind speed, humidity, sunrise time and special advisories. It gets its information from four different Web-based sources. The computer, which is based on the Galaxy client/server architecture used by SLS in all its conversational systems, is part of the lab's efforts to achieve language understanding in a computer. Among the types of questions Jupiter can understand: What cities do you know about in California? How about in France? Where is it sunny in the Caribbean? What's the wind speed in Chicago? Will it rain tomorrow in Denver? While Jupiter processes a question, the caller is treated to a rendition of the theme song from Jeopardy, lending an air of excitement and suspense to the process.



To talk to Jupiter yourself, call 888 573-8255 (within the U.S.) or 617 258-0300 (outside the U.S.). For more information on the project, visit *www.sls.lcs.mit.edu/jupiter.* ■

The Bionic Man

IMPLANTED TECHNOLOGY Talk about having a chip on your shoulder...or in this case practically in it.

Last August, Kevin Warwick, a professor in the cybernetics department at the University of Reading in Reading, England, had a silicon chip transponder implanted in his arm that linked him directly to a computer network, allowing computer signals to travel in and out of his body. Doctors implanted the transponder during a 15-minute operation that required only a local anesthetic.

During the transponder's tenure in his body (the doctors removed it after eight and a half days), Warwick's life changed in some rather odd ways. When he walked through the door of his department, for example, a computerized voice greeted him: "Hello, Professor Warwick." A light in the laboratory's foyer came on, and a computer opened to his Web page and furnished him with an up-to-date count of his e-mails. And

ILLUSTRATION ABOVE BY DAVE KLUG; BELOW BY JAMIE HOGAN

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Trendlines

Warwick had nowhere to run to, nowhere to hide: A map of the building on a PC tracked his whereabouts at all times.

The psychological effect on Warwick was unexpectedly profound. "I did feel a very strong closeness to the computer with which I was linked—I didn't expect that at all," says the professor, who sees the future of uniting computers and humans as both exciting and ominous. On one hand, there are endless opportunities for streamlining the computer interface, operating systems directly through our nerve signals and thought processes. On the other hand, says Warwick, "It does point more toward humans simply becoming nodes on a machine-controlled network." The question, Warwick says, comes down to "who will be running things in the future, humans or machines?"

The most important lesson he took away from his time with the transponder: "It made me realize how the human body is just another being—not so special."

Warwick is not the only scientist pondering such questions. At British Telecommunications Laboratories in Martlesham Heath, England, researchers are looking at different ways of uniting humans and computers, including implanted technologies that might one day allow people to carry such data as medical records, bank information and driver's licenses embedded right in their bodies. Peter Cochrane, BT's head of research, points out that more than 1 million people are already living with embedded chips in the form of pacemakers or other medical equipment. "It is now unlikely you will live a full life span without some form of implant," says Cochrane.

But what of the implications for humans as computers become more intertwined with us? "People are the real troublemakers," says Cochrane. Nevertheless, he concedes that as computers develop personalities, the possibility of becoming psychologically linked will become greater.

And you thought too many potato chips could be dangerous.

–Meg Mitchell

Off the Shelf

Thinking Big

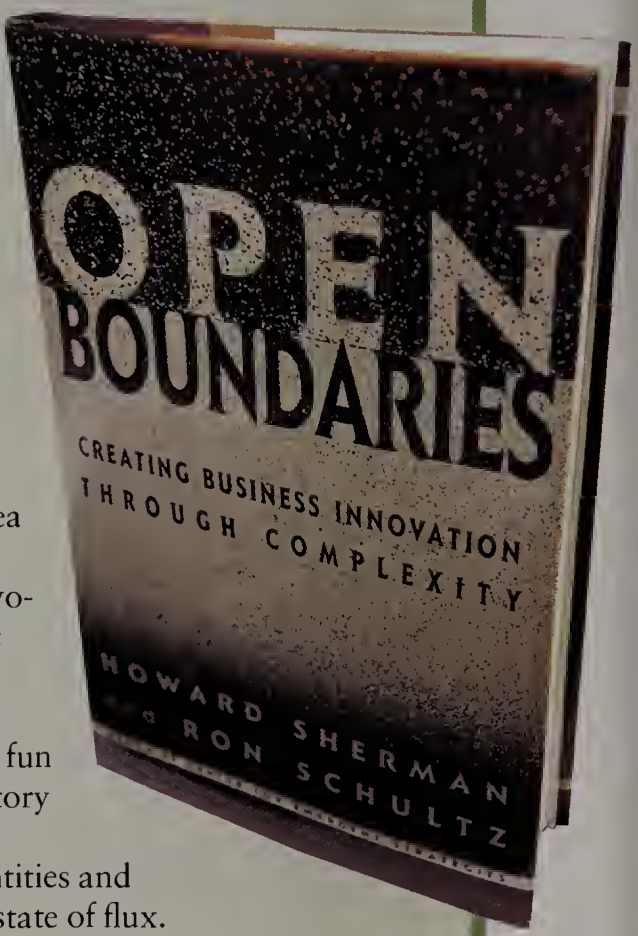

PHOTO BY VITO ALUIA

Open Boundaries: Creating Business Innovation Through Complexity

By Howard Sherman and Ron Schultz

Perseus Books, 1998, $25

HOWARD SHERMAN AND RON Schultz begin their book by explaining, "The reason the chapters aren't numbered was to reinforce the idea that they form a nonlinear pattern, which, because of the limitations of a two-dimensional book, defy the holographic dimensions of its topic."

This declaration is more off-putting than need be for a book that is so much fun to read. *Open Boundaries* is an advocatory book. Its goal is to encourage us to stop thinking about corporations as static entities and imagine them as systems that exist in a state of flux.

Sherman and Schultz offer many examples of how a company's business processes are influenced by forces beyond anyone's control: weather, natural disasters and unpredictable societal events. Sure, everyone knows that, but few people draw the conclusions from these givens that Sherman and Schultz do. For example, they urge readers to stop thinking about weather as a force outside the organization and start thinking about it as part of the business system, because weather often influences the demand for a product. Floods in North Dakota ruin carpets and therefore put production pressure on a carpet manufacturer several states away. The Yankees winning the World Series produces an uptick in Heineken beer consumption because the city is celebrating. The authors argue that corporations that see themselves as influenced by factors beyond their immediate business processes and cycles, as complex adaptive systems, will be more successful than those that don't.

Many, if not all, of the thoughts in *Open Boundaries* come from the Santa Fe Center for Emergent Strategies, where Sherman is managing director and Schultz is an affiliated consultant. Those thoughts are as much about changing our perception of business as they are about changing business, and a large part of *Open Boundaries* is more interesting than it is applicable. While many companies are mentioned in the book, their stories are more like interesting anecdotes than persuasive case studies, and cynical readers are likely to suspect reasons other than those presented by the authors for the companies' successes or failures. Interesting, however, is an excellent reason to shell out $25.

–Art Jahnke

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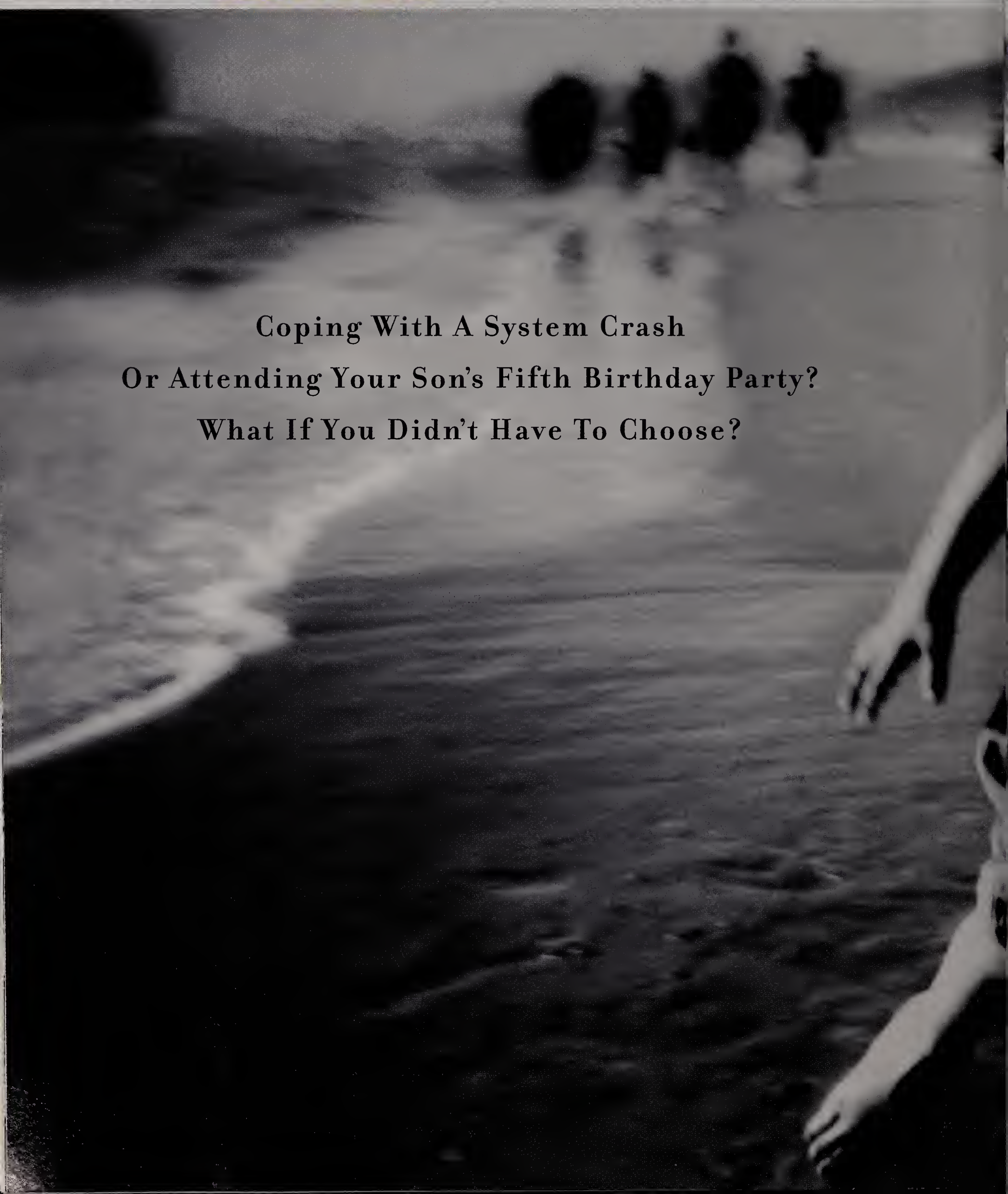

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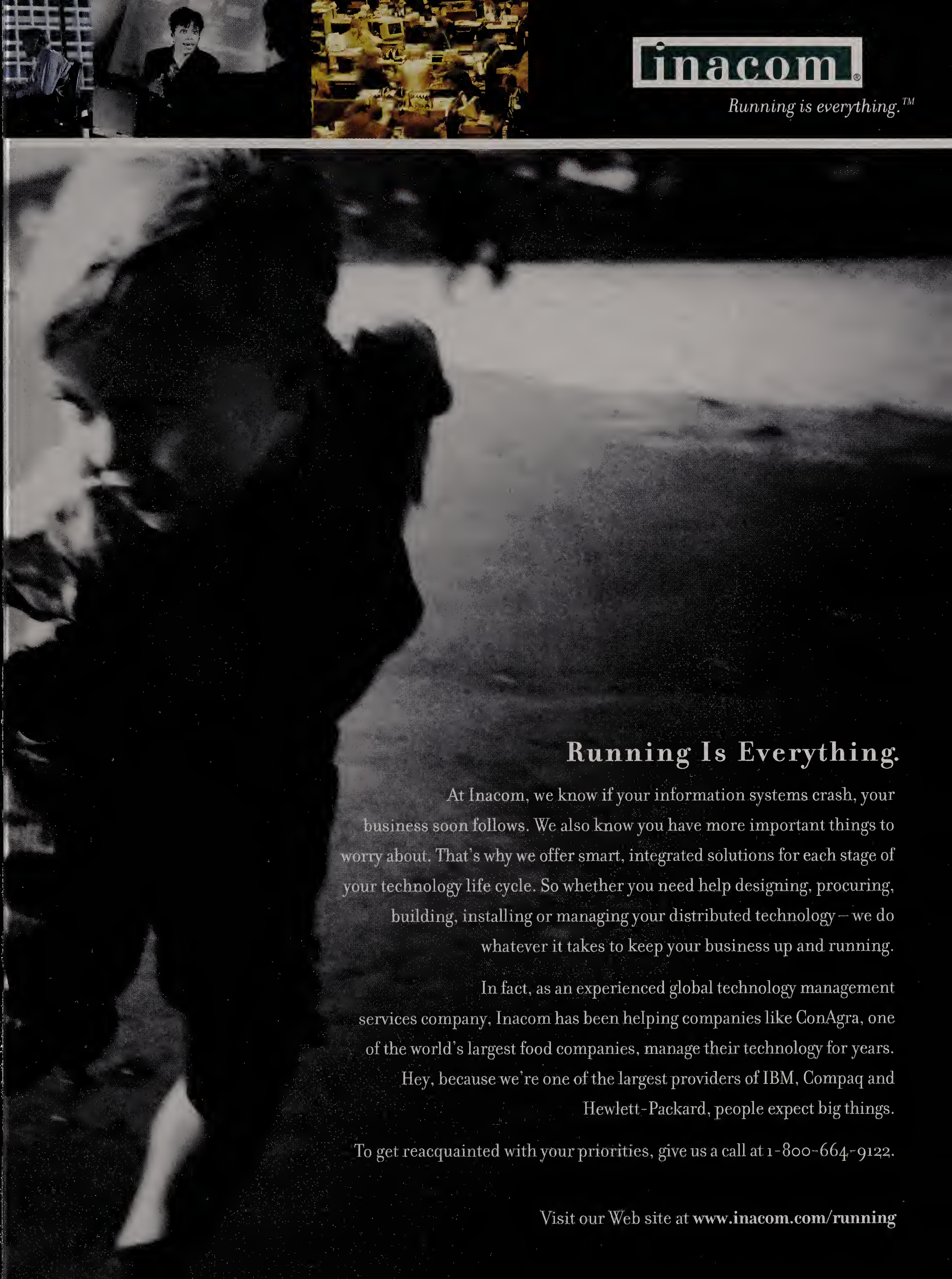
Or Attending Your Son's Fifth Birthday Party?
What If You Didn't Have To Choose?



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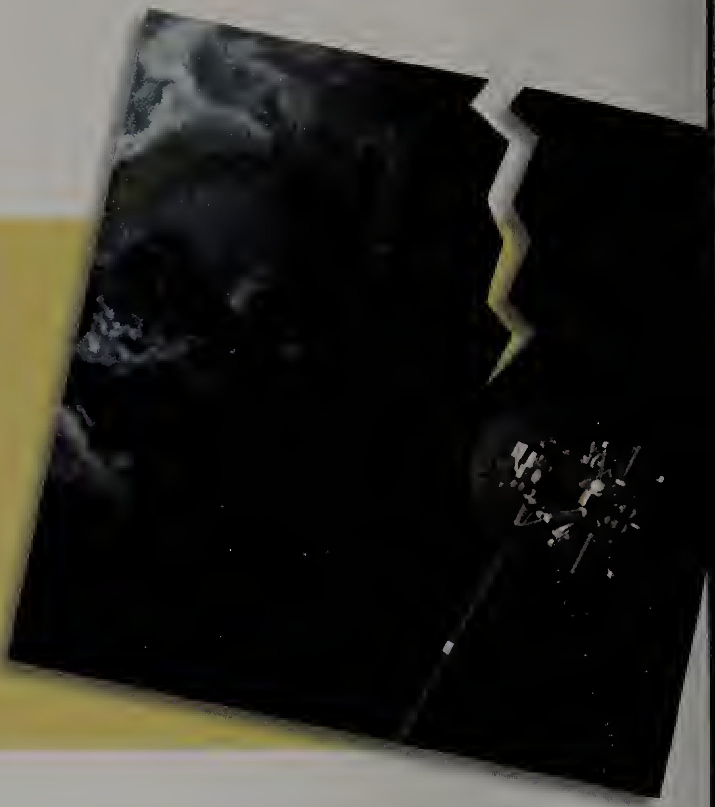
Strange but True

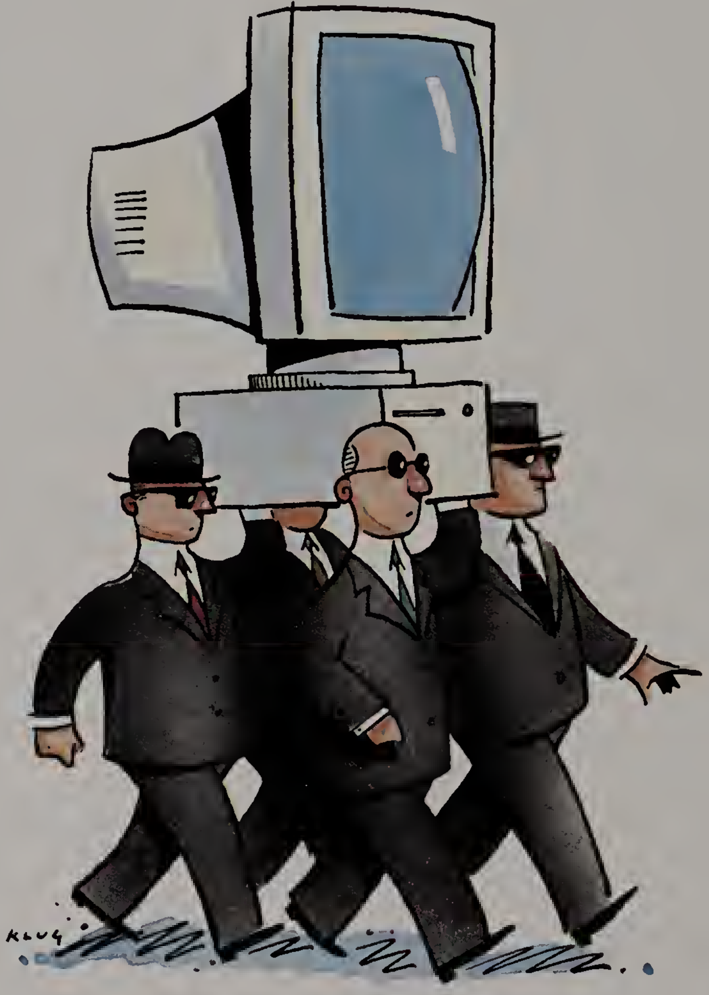
The satellite problems last August that caused disruptions in television broadcasts and pager services, among other areas, resulted from a massive "star quake" in a superdense, supermagnetized neutron star 20,000 years ago and as many light-years away. The ancient burst resulted in a wave of X-ray and gamma ray radiation that made its way to earth last year and sent some satellites into "safe hold" mode. Says astrophysicist Kevin Hurley at the University of California at Berkeley, the phenomenon was "about the wildest thing in 30 years since we've been monitoring these things." ■ Source: *Science*



The End of the Road

COMPUTER DISPOSAL Where do old computers go when they die? According to Carnegie Mellon University, approximately 325 million PCs will have been retired in the United States by 2005. Indeed, computer life cycles are getting shorter and shorter due to rapid technological advances. Through 2002, most IT equipment will retain less than 10 percent of its initial purchase price value after three years, according to GartnerGroup Inc., a Stamford, Conn., consultancy. That problem is expected to accelerate in the next year as companies conduct software and hardware upgrades in response to the Y2K problem.

So what becomes of all this outdated equipment? It's not just a matter of throwing it on the junk heap: Federal regulations prohibit computers from simply being tossed out with the trash. For many companies, disposing of outdated computers and the data on them is such a headache that they simply rent out warehouse space and let the outmoded boxes sit until something can be done with them.



But in recent years a new industry has sprung up to address the problem. For example, Retro Box Inc. (*www.retrobox.com*) is a division of Resource One Computer Systems Inc. that specializes in computer disposal. According to Stampp Corbin, president and CEO of the Columbus, Ohio, firm, there are many reasons businesses hire disposal companies rather than do the job themselves. A main one is that hard drives need to be carefully scrubbed before they are resold or tossed out because confidential data can still reside on them even after they have been erased, Corbin says. Companies that allow piles of unwanted computers to sit in warehouses also risk paying unnecessary storage fees. And property taxes continue to accrue so long as a company cannot show the IRS exactly where an old computer was deployed.

Retro Box can upgrade a company's hardware for redeployment or sale or dispose of it in an environmentally sound way and provide proof for tax purposes. In any event, Corbin claims that companies can come out ahead. "Even if they pay us the fee to get rid of the computers, they now no longer have to worry about them or pay a storage fee on them," he explains. Retro Box charges an initial refurbishment fee based on the fair market value of the computers a client wants to resell, then takes a percentage of the sale proceeds that is based on the amount and type of equipment being retired.

"People don't have to hack into your system to perform corporate espionage," Corbin warns. "They can just get it off your old hard drives." –*Mindy Blodgett*

ILLUSTRATION BY DAVE KLUG

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Trendlines

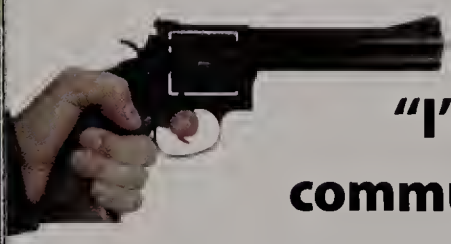
Corps Competency

I.T. VOLUNTEERS In the 1960s the Peace Corps called on millions of Americans to help developing nations build their infrastructures and join the world market. In the 1990s the Tech Corps (*www.ustc.org*) is calling on members of the technology industry to assist public schools nationwide with the integration of technology in the learning environment. Although Tech Corps focuses on domestic rather than foreign affairs, the nonprofit organization aims to improve K-12 education and prepare America's schoolchildren for competition in the global workforce.

Established in October 1995 in Massachusetts by Gary Beach, who has since joined *CIO* as publisher, Tech Corps places volunteers from the high-tech industry in schools affiliated with state chapters of the organization.

Tech Corps also aims to foster partnerships among educators, businesses and community members at the local, state and national levels. Through training programs for educators like webTeacher, an online Web tutorial, and CyberED, a national educational technology initiative whose "ambassador" is a traveling classroom equipped with PCs, printers, CD-ROMs, an Internet connection and videoconferencing capabilities, Tech Corps' educational resources address the local needs of specific school districts and are implemented through state organizations.

Last September Tech Corps was invited to the Senate Education Technology Showcase, where volunteers demonstrated the programs and efforts to integrate technology into teaching and learning. With chapters currently in 42 states and the District of Columbia, Tech Corps is setting a precedent for organizations that wish to emphasize the importance of IT in the American education system by involving businesses and communities. ■



Quotable

"I'll be safer in my community because I'll be surrounded by my neighbors. You'll be surrounded by people with guns."

–Deutsche Morgan Grenfell economist Ed Yardeni, in response to a question from a Y2K survivalist

Going Once! Going Twice! Click!

WEB AUCTIONS Is it Beanie Babies you want? How about a rare coin? Or maybe a stamp collection? These days many collectors, both serious ones and dabblers, are finding their prized possessions online and buying them in Web auctions.

One of the larger online auction concerns is Auction Universe, an interactive marketplace at *www.auctionuniverse.com* with corporate headquarters in New York City and Yalesville, Conn. The Auction Universe site, which is a little more than a year old and is owned by Classified Ventures LLC, offers visitors more than 6,000 categories of merchandise from which to choose, and a spokesman says the site has close to 100,000 registered users. Auction Universe is one of several collectibles sites, including eBay Inc.'s online auction site, that have attracted users to the relative ease of Web trading.

The sites work like this: Users click to an area of interest and search for items they are interested in. Then, using instructions given on the sites, they send in electronic bids, which are considered by the sellers. Successful buyers are then contacted by e-mail to arrange the sale. Some sites also offer "live" auctions, which allow the process to occur in real-time.

Because of potential fraud and security concerns, however, some buyers find Web auctions a scary proposition. So last fall Auction Universe began offering a program called BidSafe. For $19.95 yearly, buyers and sellers can join a program that puts a buyer's money into escrow until the item arrives. If the item never arrives from a seller, or if the buyer decides to return the item during a 48-hour inspection period, the buyer's credit card is not charged.

Larry Schwartz, president and CEO of Auction Universe, says the online auction world has exploded in the past six months and will continue to grow as people trust the system more. "That's why a program like BidSafe is so important. There's a lot of market potential out there, and we want to tap into it," he says. ■

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Align Drive

For most CIOs, aligning IT with the business is one of the hardest parts of the job. But with the help of a logical, repeatable process, it can be a whole lot easier.

BY CRAIG GOLDMAN

IN MY 36 YEARS IN I.T. MANAGEment, I have known the unique pain that CIOs and IT managers experience when they're trying to determine if their IT investments are fully aligned to support their corporate mission. As the former CIO at Chase Manhattan Bank, I remember well what it was like trying to divide up an annual pie of nearly $1 billion for IT expenditures. Each year, hundreds of millions of dollars had to be allocated to new projects designed to support various companywide initiatives. During each annual planning cycle, we would sift through literally hundreds of individual IT projects, trying to determine which ones were most important to the overall strategic mission. It was not difficult identifying the top 5 or 10 projects. But as we went further down the list, things would start to get fuzzy. What was more important: a new customer information system to support cross-product sales and marketing or a new risk management system to support global capital markets? Also, many pet projects, lacking any formal justification, often made the final list due to political or personal preferences.

I'm sure you've faced similar tough choices. But after years of reflection and working closely with colleagues in the CIO community, I've concluded that the "pain" we feel when trying to align IT with the business is not merely a result of the complex tradeoffs we face in prioritization and resource allocation or the difficulties we encounter in measuring IT value. The pain is symptomatic of a fundamental absence of a process—one we can rely on to build consensus between business unit and IT executives, that can broaden executives' thinking beyond their departmental boundaries and that can break down the parochial walls around pet projects with limited business value. Our pain is really the manifestation of our desire for an alignment process that is simple, logical, repeatable and proven.

We've all spent countless nights unable to sleep, asking ourselves the same questions. How can I quantify and demonstrate the value of my IT? How do I reduce the risk associated with the appalling industry implementation failure rate? How can I show my business people that IT is supporting the processes that they say are most important? How can I show the impact of pet projects on the success of the overall IT portfolio? How can I get the business unit people to stop throwing projects "over the wall"? And how can I get IT and business people to speak the same language? In the end, all these issues come down to one fundamental question of alignment: Is there a repeatable process I can implement to determine if I'm spending the right amount of resources for the right reasons, on the right projects, that will get us all closer to the goal line?

Unfortunately, there are no silver bullets when it comes to solving complex questions relating to alignment. That said, however, I believe there are several concrete elements that are critical in implementing a logical process by which to align IT with the business.

1. Identify Differences of Opinion

The first essential element of an alignment process is identifying divergence of opinion among various constituency groups in the company. Executives,

CORNER IMAGE BY CARL TREMBLAY; ILLUSTRATION BY NICHOLAS VITACCO

business unit heads, IT managers, operations, sales and finance people all must be individually surveyed and asked to identify and rank what they believe to be the most important drivers of achieving business objectives. Following the survey, all the stakeholders must be brought together and shown where they differ on what they think are the key business drivers and the degree to which their thinking is out of alignment.

Identifying a divergence of opinion among the stakeholders is the first step in mitigating the risks that eventually lead to implementation failure. If someone does not believe in the relative importance of a fundamental business driver, all projects associated with it that require that executive's support will be at risk.

For example, at a leading commercial bank (let's call it Big Bank), various constituencies were asked to rank key drivers. Then they were shown the extent to which their thinking was out of alignment (see "Divergence of Opinion at Big Bank," at right). Most dramatically, the strategy head believed that total reach was most important to the business, while operations was almost exclusively focused on capacity building.

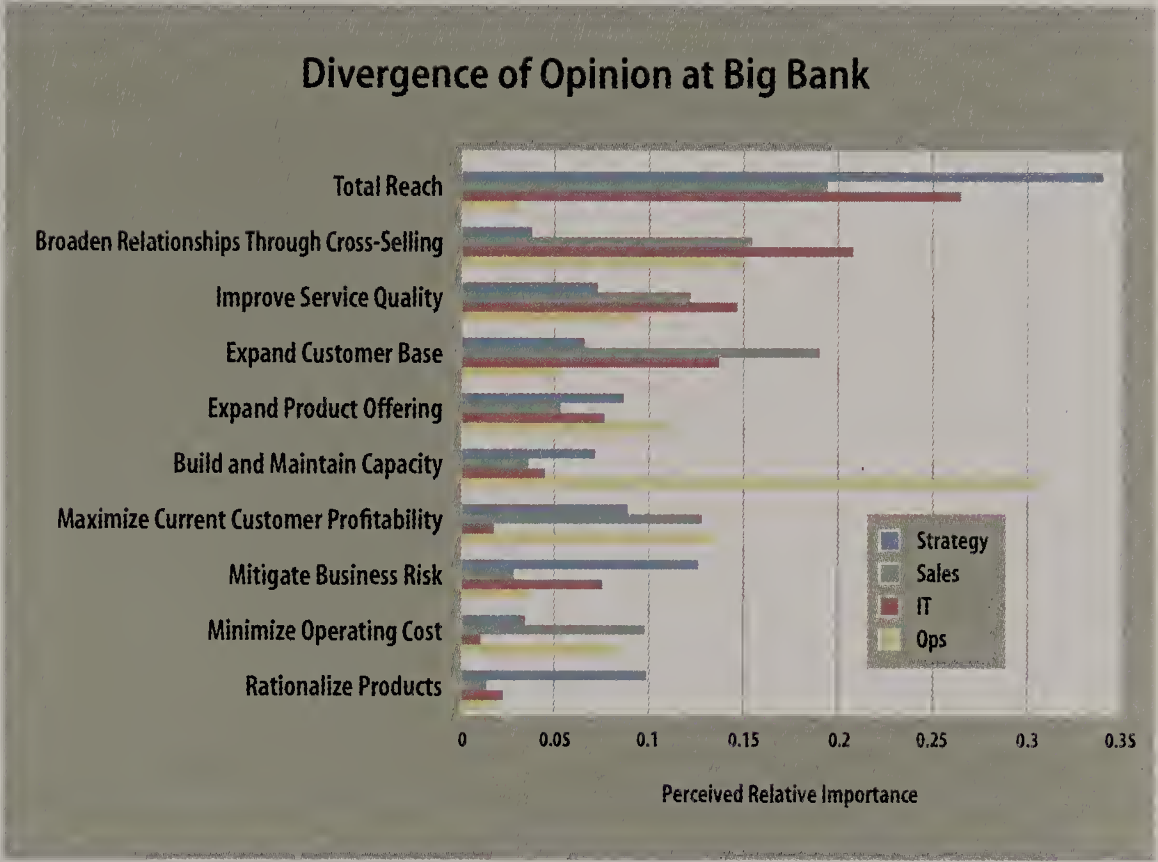
2. Prioritize Business Drivers

Next, there must be a dialogue to prioritize the drivers of the corporate vision. All stakeholders must have the opportunity to make the case for why they think certain drivers are more important than others.

This is not an easy discussion to have, and more often than not, companies don't make the effort. Outside facilitators can play an important role in the process. Because the entire alignment process hinges on achieving a consensus of vision, the dialogue is a critical step in getting all the parties necessary for the success of a project thinking on the same page.

At the conclusion of this dialogue, the group must collectively define a set of vision drivers and rank them in terms of relative importance. An effective way to tackle the prioritization is with a pairwise comparison analysis, based on utility theory, in which the group compares each driver against every other driver one by one, in pairwise fashion, with the final result being an overall ranking of most to least important.

However it is handled, the process of collectively prioritizing vision elements is the underpinning for a successful aligning of IT and the business. Not only does it ensure that key constituencies are thinking cohesively, it also allows the team to identify and mitigate risks by uncovering managers whose support is questionable. And perhaps most important, it moves the dialogue away from parochial arguments in defense of individual projects and toward fundamental elements of business value. This enables business unit and IT managers to build consensus at the beginning of the process on the most important strategic objectives driving the corporation. Gaining this consensus is an important first step in determining the order in which projects will be evaluated and resources allocated across the investment portfolio.



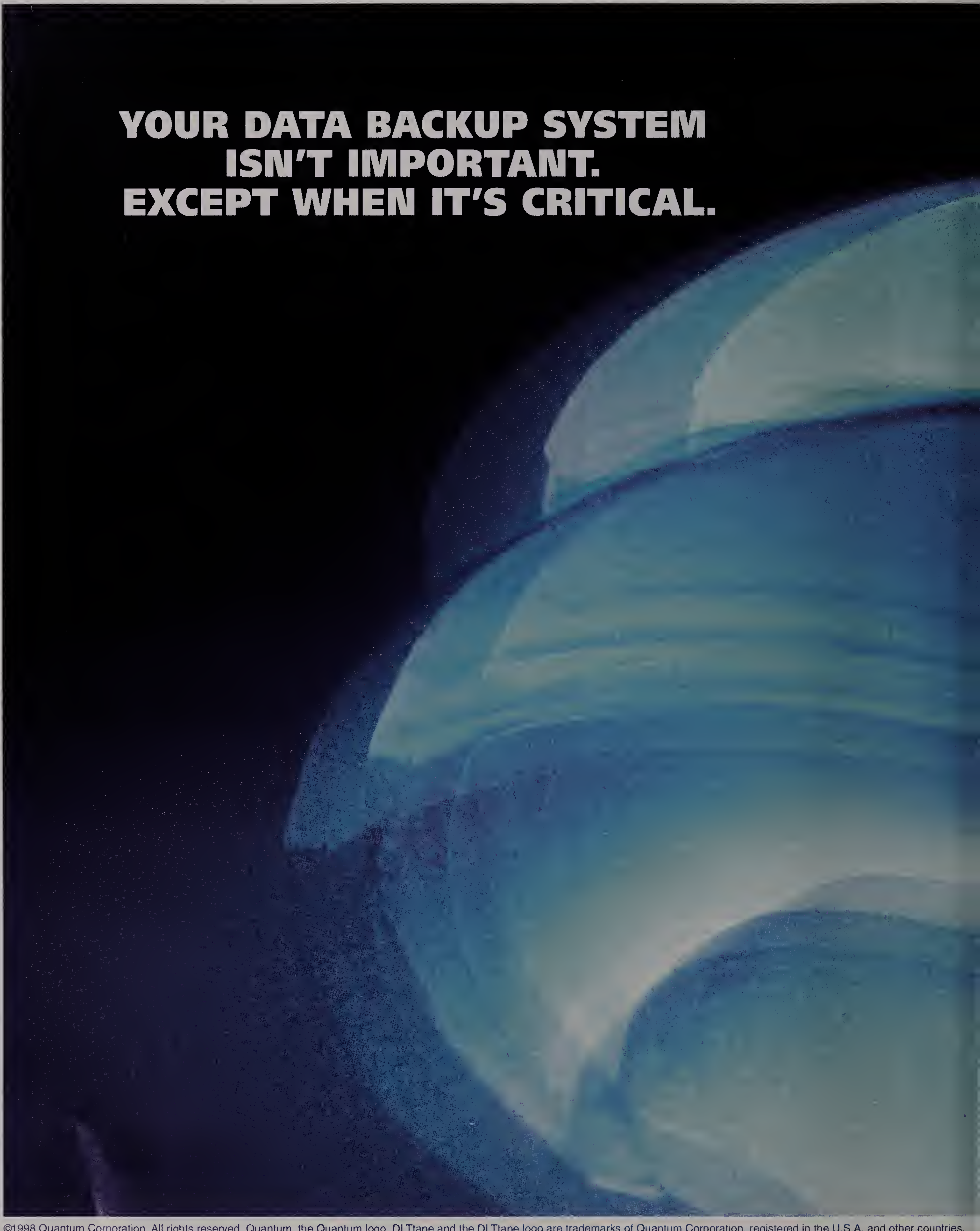
3. Link Vision, Process and Projects

Next, the company must establish the relationships among vision, process and individual IT projects. As in prioritizing the business drivers, this can be effectively accomplished using pairwise comparisons. First, starting with the prioritized list of drivers, each process should be compared with each driver one by one to assess the degree to which it supports that driver. Then, all those comparisons must be combined to arrive at a general ranking of processes, based on how well they support the prioritized drivers. For example, at Big Bank, total reach was determined to be the leading business driver among a set of 10; accordingly, the processes supporting global transaction processing and 24-hour customer support through IT were judged to be the most important.

Similarly, the group should undertake the same procedure to assess the relationships between individual IT projects and the newly ranked processes: Make comparisons between each IT project and each process on the ranked list; then, using matrix multiplications, combine those comparisons into an overall ranking of IT projects.

The mathematics underlying some of these rankings can be somewhat complex and involved; it's easier to use software that automates the process. For example, I am on the board of directors for United Management Technologies Inc. (UMT), a New York City-based consultancy that specializes in helping top managers align IT with business, and it has developed a methodology and software to do just that, making this step easier.

Using this procedure, Big Bank's management team was able to strategically prioritize its drivers, processes and projects to determine what was most important to its business success. Based on this knowledge, they could then make the most of their limited budget.



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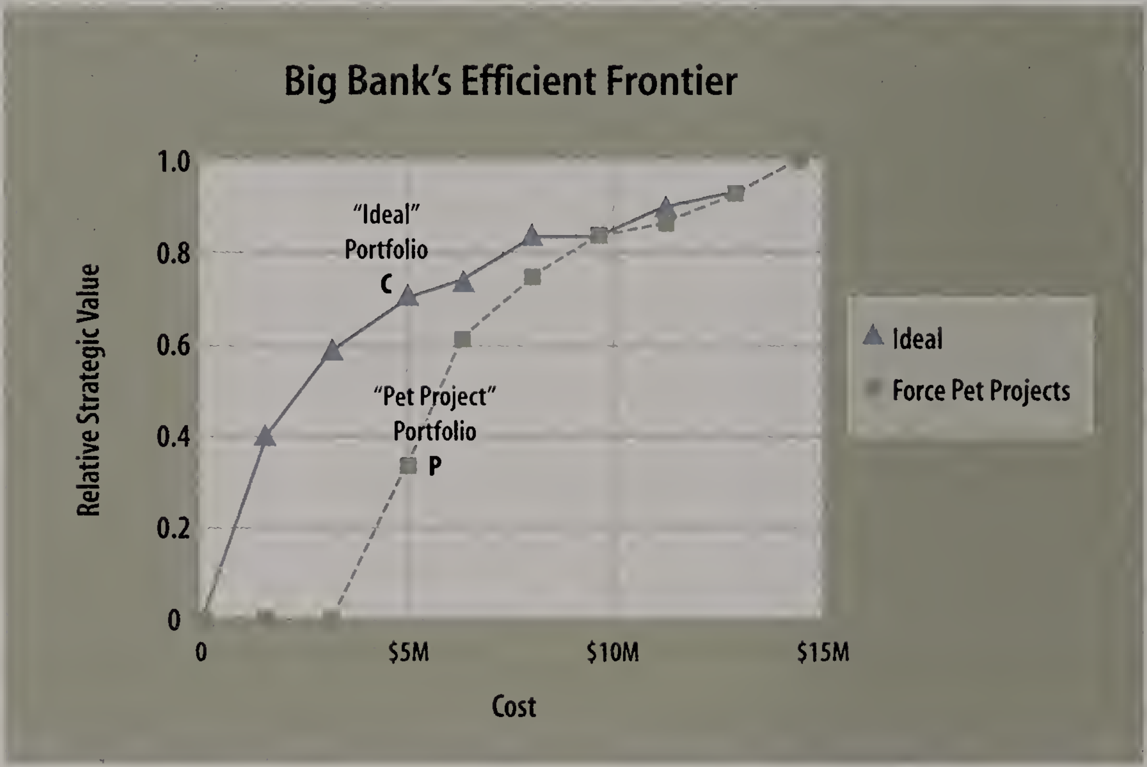
4. Incorporate Resource Constraints

The next step in the alignment process is to identify and incorporate all applicable resource constraints. The most obvious such constraint is cost, but for many companies the availability of human resources can be an even bigger one. Either way, before an organization can decide on a final portfolio of IT projects to undertake, it must apply these constraints to the consideration of its prioritized list of projects.

Using linear programming (an operations research technique often embodied in software packages, including the service offered by UMT), it is possible to determine an optimal portfolio for each resource constraint. So, for example, focusing on a constraint of budget, you can get a graph—called an "efficient frontier"—of optimal portfolios for various budget levels. By finding the point on the curve corresponding to a particular budget amount, you can determine the optimal IT project portfolio for that level.



At Big Bank, for example, management had a budget of $5 million. To determine the optimal project portfolio given this constraint, an efficient frontier was generated (see "Big Bank's Efficient Frontier," above), and it was clear that project portfolio C would provide the optimal strategic value at that level.

Efficient frontiers can be generated for other constraints as well, such as human resources, showing the optimal portfolios for various levels of those constraints. For an overall view, it is also possible to get an efficient frontier taking all constraints into account. In each case, however, one particularly useful feature of this step is that the shape of an efficient frontier can be used to decide when it makes sense to allocate more of a given resource to an IT portfolio. In an efficient frontier for cost constraints, for example, places where the curve is sharply rising indicate that a small increase in budget could result in a large increase in the strategic value of the optimal portfolio. By contrast, in cases where that efficient frontier flattens out, a large increase in budget may not produce a significant increase in the optimal portfolio's strategic value and so would not be worthwhile.

Another attractive feature of this process is that it allows managers to perform "what if" analyses to determine the effect of making changes to constraints or of forcing pet projects into the portfolio. Big Bank, for example, wanted to see the effect of including an expensive pet project in its portfolio. At its budget level of $5 million, however, the "forced" portfolio including this project (portfolio P on the graph) provided significantly less strategic value than portfolio C did. So management decided to forgo the pet project and implement portfolio C.

By assisting in the analyses of the strategic importance of myriad project sets, this alignment process empowers the company to define its IT initiatives by the value derived from the cooperation of business unit and IT executives as opposed to the declared value of departmental managers whose strategic thinking ends at their department's boundaries on the organizational chart.

In the end, this alignment process enables the team to view all IT investments as a portfolio of projects measured by strategic importance and the company's ability to successfully implement them. Most important, it provides the management team with the tools and the ability to measure, analyze and align the IT portfolio on a continuous basis throughout the year, as opposed to just during the traditional yearly planning cycle.

What strikes me about the process is that it makes sense. It is simple. It is rooted in logic. It is repeatable, and it is proven. It provides CIOs with the techniques by which to change people's attitudes and develop commitment to shared vision and shared goals. It enables CIOs to measure not just the ROI of individual projects but entire relationships between business processes, systems and new initiatives. And finally, it allows both IT and business unit executives to visualize the IT portfolio as a whole and see the degree to which IT is aligned to meet the corporate mission.

It is true that there are no silver bullets when it comes to alignment. But this operating model allows CIOs to resolve priority issues based on an established business value road map, thereby minimizing the pain and risk that comes with our territory.

Craig Goldman, president and CEO of Cyber Consulting Services Corp. in Mahwah, N.J., served as CIO of The Chase Manhattan Bank from 1991 to 1996. He is a member of the executive advisory boards of Intel Corp., Compaq Computer Corp., IBM's Lotus Development Corp. and Platinum Technology Inc. He can be reached at ccscyber@bellatlantic.net. *Editorial assistance was provided by Jeff Parness, United Management Technologies Inc.'s director of strategic relations. He can be reached at* jparness@umt.com.

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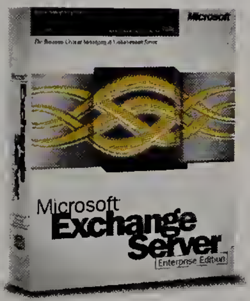

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Barbara Koster: At Prudential, mobile's portion of the IT budget has gone from 5 percent in 1997 to 20 percent today.

THE ROAD RAGE

Road warriors are a growing breed, and that means IT's headaches are on the rise. To support mobile workers successfully, IT must often take a whole new approach.

BY MINDY BLODGETT

A USER CALLS THE HELP DESK IN A PANIC BECAUSE HER laptop's hard drive just sizzled and she has an important PowerPoint presentation in the hotel conference room later that day. A road warrior leaves his $5,000, fully loaded notebook computer on the front seat of his rental car as he dashes into a gas station to ask for directions; when he returns to the car, it's gone. A harried vice president trying to catch up on e-mail from home frantically pages the help desk at midnight when it appears his laptop's modem isn't working.

These are the kinds of war stories that IT staffs with significant populations of mobile workers tell all the time, and that trend promises to continue as the prevalence of mobile computing continues to rise. According to Dataquest Inc., a market research firm based in San Jose, Calif., the worldwide corporate mobile computing market is growing dramatically: Shipments of laptops, notebooks, ultraportables and transportable units increased from 7.8 million in 1995 to a forecasted level of 12.3 million in 1998. Behind this trend are corporations that are changing the way they spend their IT dollars. At The Prudential Insurance Co. of America in Newark, N.J., for example, the portion of the IT budget devoted to mobile has gone from somewhere around 5 percent in 1997 to around 20 percent today, says Barbara Koster, CIO of Prudential's Individual Insurance division.

Reader ROI

BY READING THIS STORY, you'll learn

- What IT can do to support mobile users better
- How to protect hardware and corporate data in a mobile environment
- Ways to keep costs under control

PHOTO BY JOHN RAE

The shift from predominantly deskbound workforces to staffs full of roving employees has brought with it a whole new cost-benefit equation. While the total cost of ownership for mobile computing is higher than that for a comparable desktop—GartnerGroup Inc. in Stamford, Conn., estimates that the hard-core road warrior can cost an organization approximately 60 percent more in end-user operations expenses than does a desktop worker (see "Cost Control," Page 41)—the benefits can outweigh the headaches and increased costs. Among mobile computing's advantages, for example, are reduced real estate costs, since the technology allows companies to add to their staffs without significantly increasing their square footage. Another oft-cited benefit is increased productivity. "I haven't done a quantification of the productivity increases, but it's just common sense that if someone is sending out e-mails from [his] laptop at 9 p.m., then [he is] putting in extra work," says David McCue, CIO at CSC Healthcare (formerly American Practice Management Inc.) in New York City, a wholly owned subsidiary of Computer Sciences Corp.

As more and more workers hit the road, whether they use laptops or handhelds, IT staffs are finding that the nature of mobile computing has changed their modes of operation forever. CSC Healthcare, for instance, has about 85 percent of its 400-strong consulting and business force on notebooks. "Road warriors definitely impact how we do things [in IT], and that can be a challenge," McCue says. "You trade off hardware costs and support issues for more productivity."

There is, it seems, no turning back—IT just has to adjust. Some companies have added staff to handle the special concerns and 24/7 requirements of the mobile worker. Other organizations have simply changed the focus and training of their IT staffs and help desks. And for companies with large mobile workforces, security of both data and hardware are ongoing concerns. In short, CIOs with expanding populations of untethered workers need new ways to care for and feed this growing generation of road warriors, and they need them now.

Help Desks

Supporting the Untethered Worker

Laptops are more difficult to configure, support and maintain than desktops. Few IT executives or mobile market observers would argue with that assertion. "The support issues are the biggest ones for IT and mobile computing," says Chris Goodhue, a vice president in GartnerGroup's end-user computing service. "What happens when somebody in Kuala Lumpur has a hard drive that crashes? These are things IT support staffs have to deal with all the time."

Roy Schwartz, vice president of information systems and field technology for Prudential, recalls the time that a Prudential agent forgot how to log on and called the help desk, which over the weekend had switched to off-hours staffing. A field vice president had to be found to authenticate the agent, and that took until 2 a.m. the following day. In response to this incident, Prudential changed its authentication and password procedures so that the off-hours help desk can handle such an emergency without having to track down a field vice president.

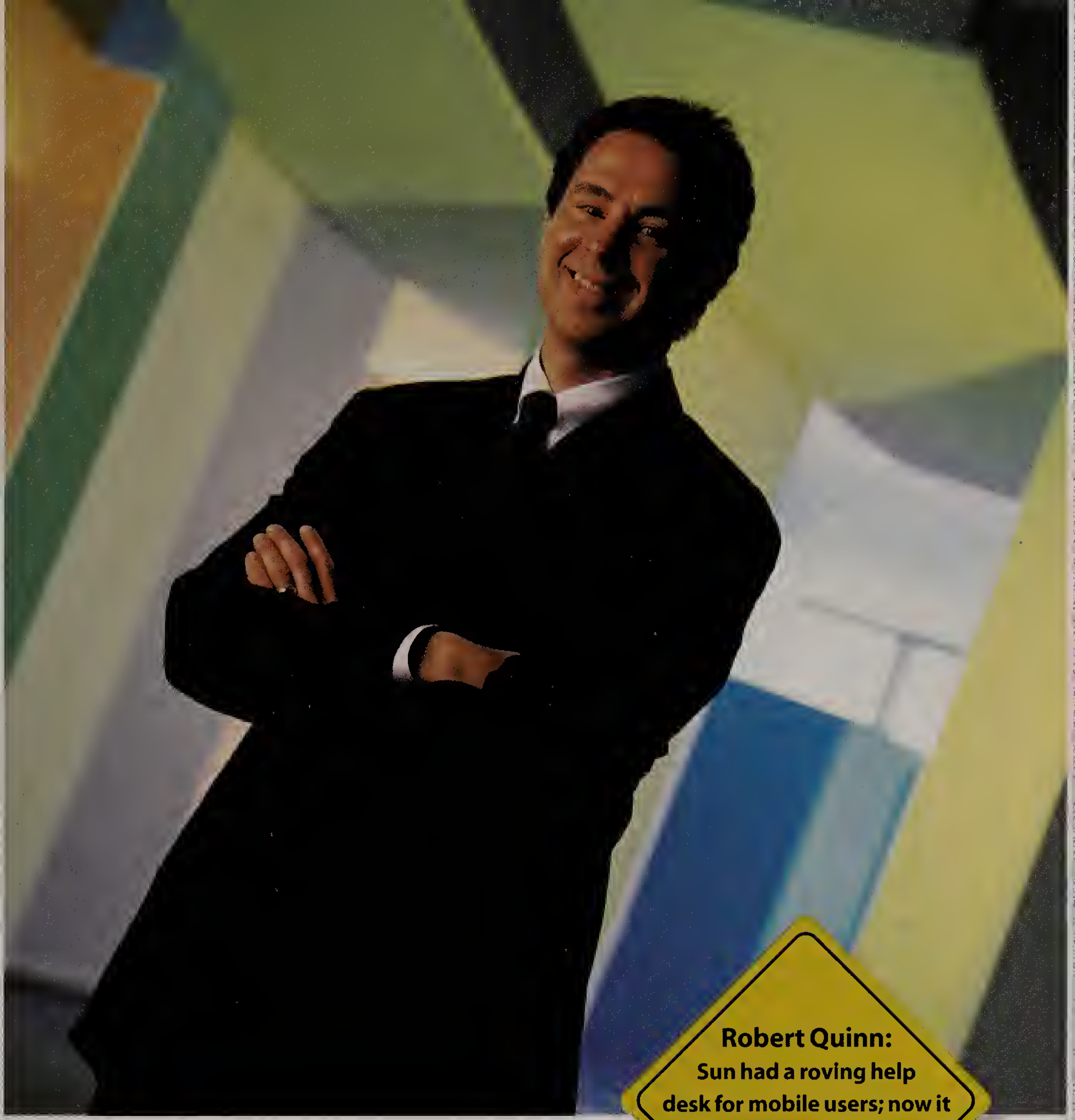
For some companies, outsourcing at least part of the help desk function can be a solution to the support problem. For instance, McCue estimates that CSC Healthcare has saved between $500,000 and $600,000 annually by outsourcing its hardware support while maintaining an internal help desk for software-related questions and more general concerns. The company's current notebook supplier is Electro Rent Corp., which is providing IBM ThinkPad laptops with removable hard drives and CD-ROMs. "The way it works is if there is a problem with the hardware, the user can call the help desk and, if need be, they are

David McCue:
Help desk staffers must use the same technology as users, so they understand the issues.

PHOTO BY JOHN RAE

FedExed a new laptop or hard drive right away," he explains.

For Robert Quinn, vice president and CIO of the computer systems division at Sun Microsystems Inc. in Menlo Park, Calif., finding a solution to the mobile support and help desk dilemma was a matter of trial and error. The company's laptop users currently number about 7,500 out of a total user population of about 25,000. "We've had to put a lot more thought into what we do in terms of mobile support," Quinn says. For example, when the company first started seeing an explosion in laptop users in the mid-1990s, IT used to send people around the country fixing laptops at the "scene of the crime." "We had regionally based people who would go anywhere they were needed," Quinn says. But the cost of such a go anywhere, anytime roving help desk was high. "So we backed off that model and now we have more of a filling station model," Quinn says. "We outsource hardware problems to our systems services vendor, Vanstar Corp. If someone needs a software upgrade or has a hardware problem, [he or she] can ship the system to Vanstar, which does most of the handholding of the users."



Robert Quinn: Sun had a roving help desk for mobile users; now it outsources hardware support.

PHOTO BY KENT HANSON

Most of the 10 to 15 IT staffers Sun allocated to provide internal, personal service to the company's telecommuters and traveling and home mobile users have been redeployed, and an internal help desk still provides 24/7 service. And to make using the laptops as easy as possible, the machines from Toshiba America Information Systems Inc. are configured according to need. The three possible configurations range from a standard style, including personal productivity and contact management software, to one for the highly mobile power user, which has more memory and connectivity features.

Training of both users and support staff is another key to supporting mobile users. "Users have a much more emotional, intimate attachment to their mobile devices than to other technologies," says McCue. "When something isn't working, and they're on the road, users are much faster to panic." Accordingly, McCue says he has focused on training his internal help desk to "be really good listeners and to let the users vent." McCue also mandates that his help desk staffers use the same hardware and software as the users, "so they understand the issues and can do their jobs from anywhere."

> **"The biggest problem IT managers have today is that their corporate data is not just on the network—it is exposed to the outside world through the laptop as well."**
>
> **–ANDREW SEYBOLD**

At Prudential, such a great emphasis has been placed on user training as part of the company's $100 million LaunchPad mobile initiative that no agent or high-level executive is given a laptop until he or she shows up for two full days of how-to classes. Field agents who were perceived as leaders were recruited by IT to become part of the training effort. Slightly more than 20 of them became special mobile trainers, and they are now part of the IT team, at least temporarily. In addition, 20 new permanent IT staffers were hired to bulk up the help desk and support staff. After life insurance policy sales more than doubled for a sampling of a 500-person pilot program, the company proceeded with the rollout and expects to have 12,000 agents and field management on laptops by the middle of this year. It also plans follow-up training through interactive TV, CD-ROM and more classroom instruction as the rollout progresses. According to Koster, "More than 50 percent of the success of this [project] will be due to training of both the users and the help desk."

The process of software distribution can also change as the number of mobile users increases. At Prudential, Bob Piccirillo, vice president of field infrastructure, set up a release management team of five IT staffers that focuses on distributing software upgrades on CD-ROMs and managing remote software. In addition, a team of three tracks communication needs for the growing ranks of mobile users. And in a bid to make the release of software upgrades easier on IT, the staff now spreads rollouts over a five-day period. "We once sent out a software release to 10,000 agents, and our help desk was overwhelmed with 2,200 calls at once," Schwartz says. "So now that we have a five-day rollout, no one calling our help desk has to wait for more than two minutes for help." All this has led to happier customers, both internally and externally, Koster says. "Now that the agents can have all the data at their fingertips, they can make faster sales," she explains.

Security

When Data and Hardware Hit the Road

"The biggest problem IT managers have today is that their corporate data is not just on the network—it is exposed to the outside world through the laptop as well," says Andrew Seybold, editor of the newsletter *Outlook on Communications and Computing*, based in Boulder Creek, Calif.

Last year Terry Davis, director of enterprise technology in the IT group for Coors Brewing Co. in Golden, Colo., says his company lost about $125,000 worth of hardware to thefts worldwide, and between 80 percent and 90 percent of those were of laptops. In response, he says his department has put together a security awareness program aimed at warning the roughly 1,500 laptop users at his company of the dangers of leaving notebook computers unattended. Through memos and training sessions, Coors is making users aware of many of the typical robbery scams, such as the one in which teams of thieves loiter at the X-ray machines in airports: While one thief purposely stalls in front of a traveler with a laptop in the X-ray line, another snaps up the machine as it travels down the belt. And to protect his company's data, Davis says he is considering some products that provide encryption technology, requiring a user to have a "key" to operate a laptop.

Some companies have a solution to the hardware-loss problem that users might find painful: They require the user to purchase the laptop. The theory, of course, is that once it's yours, you'll take better care of it. Howard Arkin, senior vice president and CIO at Gould Paper Co. based in New York City, says that the company's IT staff maintains a preferred vendor list from which members of the sales force have to buy their laptops if they want to connect to the company's network. To ensure the security of data on the network, the company maintains an intranet with a firewall that users must go through to gain access.

When an organization has a large mobile workforce, critical data routinely leaves the corporate infrastructure on laptops. According to GartnerGroup, organizations can address this problem by either providing local backup tools to their laptop users and instructing them to adhere to a strict backup policy or they can implement automated laptop backup processes that include backup storage on corporate servers. GTE Internetworking in Cambridge, Mass., has decided to go the automatic route. Nine months ago it began to roll out security software from Connected Corp. that automatically creates backups to a remote server while compressing and encrypting the information. The company also uses technology that detects a stolen laptop by tracing it via special software installed on the device.

Terry Davis: After suffering numerous laptop thefts, Coors has developed a new mobile security program.

PHOTO BY CHRIS SHINN

Technology

Gadgets for the Mobile

While corporate IT departments struggle to keep up with the demands of their mobile users, vendors are developing products to make life easier for users and the departments that support them. Seybold predicts that personal digital assistants will get better and more useful, making it unnecessary for many users to lug around laptops. By the end of 1998 some vendors were shipping small notebooks with Windows CE operating systems for less than $1,000; such devices are aimed at users primarily interested in word processing and e-mail, though PowerPoint was available on them as well. As for security, Seybold says that some laptop vendors are working on thumbprint technology that would read the fingerprints of users, while others are employing technology that would "read" the retinas of users to ensure that the right person is logging on.

Whether or not these James Bond-like technologies ever reach the marketplace, there is little doubt that for many companies, especially those in industries with large sales forces or roving engineers, mobile computing is here to stay. "With mobile computing, you have to spend a lot of time figuring out

ways of working smarter," says John Puckett, vice president of information technology at GTE Internetworking. At GTE, for example, IT is rolling out software that diagnoses laptop problems and takes control of a machine remotely, walking the user through fixes. Like the antitheft application, this software is part of a program seeking to reduce the total cost of ownership. "We are already seeing productivity increases with that system," Puckett says, for both the users and the IT staff. "An organization can't spend too much time looking at the hardware costs when it examines mobile computing. There are definitely enormous challenges, but it is our job in IT to figure out the most efficient ways to support this type of computing so that business can be more productive." CIO

Senior Writer Mindy Blodgett can be reached at mblodgett@cio.com.

Cost Control

Mobile computers may be more pricey to buy and support, but there are still ways to keep costs down

THERE IS CERTAINLY NO DENYING that a mobile workforce can be expensive. According to figures from GartnerGroup Inc., the costs of ownership for notebook computers exceed those of desktops by 20 percent to 53 percent on a yearly basis. Much of this differential is in end-user operations costs. GartnerGroup analysts estimate that the hardcore road warrior can cost an organization approximately $5,500 each year—due in part to the "futz" factor of workers who are often expected to learn their mobile systems while on-the-go—compared with desktop workers, who might cost an organization $3,500 annually in end-user needs. There's a large difference in hardware costs too: A laptop can cost the enterprise about $3,000, compared with $2,400 for a desktop. All in all, a road warrior can cost a company $12,000 annually, while a desktop Windows user can cost the same company about $8,000, according to GartnerGroup.

Nevertheless, mobile computing analysts say there are many ways IT can trim the high cost of supporting and maintaining road warriors.

- Don't buy one-size-fits-all notebooks. "Let the usage patterns and the business requirements drive the deployment of the technology," says Chris Goodhue, a vice president in GartnerGroup's end-user computing service. "You have to make more of an effort to understand the unique requirements of the users. Are they only occasionally mobile? Do they want only access to e-mail? What are their bandwidth requirements?" Many companies can get good use from midrange or even value-end laptops or handhelds rather than the latest and greatest.
- Stay away from the more expensive docking stations and buy port replicators instead, GartnerGroup recommends. That move alone can save IT some $400 per unit.
- Spend more time on upfront training for users. "Companies typically don't spend enough time on training, and the problem is that a mobile computer never malfunctions between 9 a.m. and 5 p.m.," says Andrew Seybold, editor of the *Outlook on Communications and Computing* newsletter, based in Boulder Creek, Calif. Users better versed in how their laptops work might be able to trouble-shoot more problems themselves, such as by checking a laptop's configuration.
- Reevaluate notebook requirements on a yearly basis to ensure the highest return on investment. For example, make sure that the right workers have laptops. Not all jobs justify the need for mobility and the higher costs associated with it. By evaluating and reevaluating TCO of laptops, companies can better manage their assets and make decisions for future purchases.
- Consider leasing: "Laptops are worse than cars—they depreciate at a very rapid rate," Seybold says.
- "Standardize on one [brand] of laptop," Seybold recommends. "Don't have a mix of vendors."

–M. Blodgett

What Dreams May Come

Ever wonder what CIOs would wish for if given the chance? We did, and we learned that in some cases dreams can come true.

BY TRACY MAYOR

PICTURE YOURSELF AT A GOLF RESORT ON THE FRINGE OF A DESERT, attending yet another executive offsite. Eager to escape the stuffiness of the conference room, you slip out onto the veranda, where you spot a bottle of designer water sticking out of the sand. You pick it up, looking for the nearest recycling bin, when out pops the CIO genie.

In gratitude for being released, the genie, who looks a lot like IBM's Lou Gerstner with a goatee, grants you one wish. (Y2K needs are taking all his other resources, so you cannot have the traditional three.) You hesitate—there's so much technology you've been waiting for, so many management hassles distracting you—but the genie is overdue at a conference in San Francisco and can't wait. He hands you a wand—clearly labeled One Wave Only—and departs on a flying carpet (business class) for the coast.

What to do? We presented the hypothetical wand to six information technology executives, who wished for all manner of magical thinking caps, crystal balls, love potions and truth serums. (Did somebody actually suggest an "end-user silencer module"?) But even when given free rein to fulfill their wildest dreams, managers in the end chose to wish for the simple but not quite achievable fixes that would most improve their workday lives. And thus we present their wishes: Truly Ubiquitous Computing, True Blue Business Partners, the Ultimate Time Machine and the Perfect Employee.

Reader ROI

READ THIS STORY TO LEARN what's atop CIOs' wish lists and how likely it is their technological and managerial desires will be fulfilled in the near future.

ILLUSTRATIONS BY MICHAEL WITTE

Oh, and just because we can't help being practical, we ran these fancies by a few top-flight futurists for a reality check. The verdict? Technology and savvy management can fulfill some wishes now and others in a short while. As for the rest, well, let's just say human nature won't be "solved" any time before the millennium.

WISH 1

Ubiquitous Computing

"I'd like a very high-speed, very inexpensive network that would cover any kind of geography," says John Glaser, vice president and CIO at Partners HealthCare System Inc. in Boston. And just for kicks, he'd like the network to be easily installed and automatically maintained. That way, Partners (founded by Brigham & Women's and Massachusetts General hospitals) would be able to deliver on-demand, video-based health care information to physicians' offices, patients' homes and anywhere else its doctors and clients are located. "For that kind of content right now, the transport mechanism is still too slow," says Glaser. "We can see it coming with T1 and T3, but we could use it now."

At Babson College in Wellesley, Mass., CIO Rick Mickool wishes for a new and improved remote computing device. "I'd like something between a PalmPilot on steroids and a network computer," he says. The handheld computer has shown some real value for remote computing at Babson, according to Mickool, but he'd like to add a few extras: built-in cellular capabilities, unlimited bandwidth and automatic authentication. "Users could dock it in the office or dock it at home, and they'd have all their information in one place all the time."

George Adler longs to unite new systems with old. "I'd wish for an instant, intuitive, common user interface that can accommodate older systems," says Adler, head of Adler Associates, an IT consultancy in Foxborough, Mass. Adler has served as a CIO at Children's Hospital in Boston and at Bentley College in Waltham, Mass. Windows 95 may be fine for the desktop, he says, but what about the employee in a car dealership who's using a 10-year-old DOS-based customer-tracking system? "We need a layer of usability that can ride over whatever's underneath it—new system or legacy," he declares.

Can the CIO genie deliver a truly universal, system-independent interface that would allow computer users everywhere to share a common language?

Reality Check "On-demand information is very close," predicts Joe Carter, a managing partner for technology research and development at Andersen Consulting in Palo Alto, Calif. Carter estimates that between fall 1999 and spring 2000 the wide embrace of digital subscriber line (DSL) service will make next-generation Internet-like capabilities commonplace and, more important, affordable for small businesses as well as for large. DSL connections deliver very-high-speed digital service, akin to today's T1 or ISDN

Top Five Daydreams

You might not waste a wave of the genie's wand on it, but wouldn't it be nice if...

1 ...you could buy a very fast, very cheap, very accurate voice-recognition system right now? Partners HealthCare System Inc.'s CIO John Glaser says what's on the market is always improving incrementally, but to truly make a productivity difference with his doctors and clinicians, he needs 99.9 percent accuracy, true speaker-independence, a million-word vocabulary, context-sensing capabilities and a price tag of about, oh, $50.

2 ...CIOs could rent time on a "redundancy crystal ball" that would tell them which backup systems they'll really need and which they can jettison? Visa USA Inc., which processes 22,000 transactions per second, must maintain 100 percent network uptime but pays a bundle for some redundant systems it has never had to use, says Executive Vice President Scott Thompson.

3 ...we could elect state legislatures that truly understand the power of information technology? Minnesota Department of Labor and Industry CIO Cynthia Valentine says there's still a suspicion among some senators and representatives that IT managers do little but throw around impenetrable jargon and take long lunches at the taxpayers' expense.

4 ...those annoying, often misleading, nearly always inflammatory salary surveys would simply disappear from computer publications? Babson College CIO Rick Mickool says he gets a couple of them slipped anonymously under his door every year, but he contends they're rarely detailed enough to be truly accurate.

5 ...end users had adjustable attention spans? Valentine says her staff has a hard time getting customers to focus on the details of a project until a week before launch, when they're suddenly full of suggestions that could and should have been proposed months before.

–T. Mayor

links, without any special external wiring. Because DSL works over conventional phone lines, home and small-business consumers will finally have a simple way to receive and distribute large chunks of digital information, including electronic conferences or interactive videos.

As for the universal interface, Carter says emphatically, "That's a browser." People are already putting Internet-based front ends on legacy systems. "They leave the legacy systems doing what they do and put a browser in front of it." And the "PalmPilot on steroids" is also just around the corner as is every faster and better iteration of an already-existing product, Carter says. "If you can see it, touch it, feel it, but it's too expensive, wait 18 months and the price-performance ratio will double," he advises.

WISH 2

True-Blue Business Partners

The laments of CIOs about IT vendors and consultants are so many and so varied that it seems easier to build a better business partner from scratch than to fix the models currently available. To begin that task, our wishers say, certain smiley-but-vague phrases would have to be permanently removed from the vocabulary, including: "What keeps you up at night?" "It's all seamlessly integrated" and "Tell us about your IT strategy."

"I'm tired of [vendors] calling me and wanting to know what I'm doing," Adler complains. "If you don't know what I need, don't come asking me."

Next step would be to administer a truth serum. CIOs want to know exactly what they're dealing with, even if it isn't as glamorous as the product hype would suggest. If this is the first time a company has sold the system, say so. If certain features have no hope of ever being included, say that too.

To all vendors:

Leave us alone till 2000.

"I wish these guys would be much more straightforward about what works and what doesn't work," says Scott Thompson, executive vice president for systems development, support and customer service at Visa USA Inc. in San Francisco. "You make bets based on what they tell you, and 5 out of 10 times it never comes to fruition. It's painful to work our way out of these problems."

The CIOs would next bestow some old-fashioned courtly manners on their model partner. "I'd like consultants who realized their utter need for my business. I'd like them to be faithful to me and truthful," says Cynthia Valentine, CIO at the Minnesota Department of Labor and Industry in St. Paul. That means return the phone calls and return them right away, even after the sale has been made. Don't run off the first time a more attractive job winks its eye. And really listen to what the client is saying rather than simply nodding acquiescence to get to the next stage of the relationship.

IT executives want consultants who truly offer independent perspective, unflinching honesty and unique solutions. "So few people have genuine thought leadership," says Thompson. "They're always telling you what you already know, but they put it in a nice binder." Even more frustrating, Thompson says, the truly top-drawer consultants never all come from the same company, which means Visa must continue to shop around to find the gems. And they're no longer willing to quit their job, move to San Francisco and become Visa employees. "It's all global now," he says, "so the consultants come from East Oshkosh, and they won't move when you want them to."

Can the CIO genie summon forth the perfect supplier and strategic partner?

Reality Check Some conflict is inevitable between companies and the vendors and consultants they hire, says John Henderson, chairman of the Department of Management Information Systems at Boston University's School of Management. But there are ways to contain the expectations and control the communications.

The trend in the past 10 years has been toward reducing the number of vendors with which you do business, a process that helps companies prioritize their outside relationships to both eliminate unsatisfactory situations and reward loyal business partners. "The ability to deepen a relationship is a strategic choice," says Henderson. "When I hear someone say, 'I wish for better vendors or consultants,' I say, 'OK, make that happen.'"

A consultant himself, Henderson says that companies need to make a distinction between those who are in the business of "intellectual reuse" and those who are truly breaking new ground in thought leadership. After you find the latter, it's the company's job to nurture that relationship for long-term gain. "I can point to 10 or 15 companies that have supported my work consistently for many years," he says. "But if a company wants to just skim the good idea off the top and then take off, it won't have much access the next time around."

WISH 3

The Ultimate Time Machine

There most likely isn't a CIO on the planet who wouldn't wish for more hours in a day and more days in the week, but some have dreamed up specific inventions for beating the clock. In the big-picture department, how about a freeze gun to stop competitors in their tracks so that you can bring your products to market first?

At Visa, Thompson finds himself constantly battling both the clock and the competition to roll out new and upgraded systems, a problem that's particularly challenging given the enormous size of his company, the depth of his systems and the cutthroat nature of the credit business. "We have over 20 years of systems," he says, "and you just don't enhance or modify those things in quick moments of time. If we could freeze time for everyone else and control and maximize it [at Visa], we'd all be superstars."

Some managers would aim that freeze gun first at IT vendors, particularly a certain infamous billionaire who churns out new operating systems and applications with frustrating frequency. "It would be nice to put a moratorium on new versions of anything. How about a little breathing space till March 2000?" suggests Valentine. New, and not necessarily essential, upgrades are a particular burden on smaller departments like her own, she says. "We aren't all that big or extremely cutting edge. Let us just get all the way onto Windows 95 first."

Wanted: Employee with no discernible personal life.

Another challenge that's particularly difficult for CIOs at small or midsize organizations is trying to balance putting out fires and bigger-picture decision making. "I wish I had more time to focus on strategic planning and could spend less time focusing on complaint or help-desk actions," says Marie Zanavich, CIO and assistant vice president at United Water Resources Inc., headquartered in Harrington Park, N.J.

Can the CIO genie's wand provide some calm in the eye of the technological storm?

Reality Check Time isn't about to flow backward, and the competitive pressures of the IT marketplace are only going to increase. With those givens, the best a CIO can do is apply technology where it can save the most time, lean hard on business relationships and otherwise soldier on, says Paul Horn, senior vice president at IBM Research in Yorktown Heights, N.Y.

"There are technologies out there now that are going to fundamentally help you skip over development cycles," says Horn, allowing companies to rapidly develop and analyze products digitally rather than physically. Not so long ago the now-commonplace concept of designing an airliner digitally rather than in physical mock-up was considered radical, Horn points out. Knowledge sharing, particularly via an intranet or extranet, can likewise help spread resources efficiently and compress development times.

Know of anything that can help our CIOs' wishes come true? Would you like to share the same frustrations and brainstorm about solutions? We can put you in touch with your peers. E-mail a message to Executive Editor Richard Pastore at *pastore@cio.com*, and we'll forward your suggestions and comments to the individual CIOs quoted in this article.

Externally, companies can keep ahead of ever-shortening technology cycles by getting not just products but advance knowledge about new technologies, techniques and strategies from their suppliers. "You need to have a real partner in the IT industry," Horn says. "You're wasting the relationship if you're just getting goods from any organization."

The Perfect Employee

"I wish I could clone or replicate my truly good staff so that I'd have three stars instead of one," says Minnesota Labor and Industry Department's Valentine. So far, pesky legal prohibitions make human cloning, even of technologists, illegal in most states. In the meantime, Valentine lists her criteria for the dream employee: "Technically gifted, astute, interested in staying on top of his game, good at dealing with a broad user community, able to come up with technical solutions to business problems, years and years of experience to truly understand the business, pleasant, hard working and balanced." And one more thing, Valentine adds with a laugh, "no discernible personal life."

Visa's Thompson has his own perfect employee in mind, a rarefied individual who can prudently guide the steady progression of new and enhanced business systems. "I want a person who can think about what you have in place today and evolve it to the next generation without having to start from scratch." Too many IT specialists take a big-bang approach to projects and recommend a completely new roster of systems, Thompson says, rather than positioning technology to strategically evolve from one function to another.

And once these dream employees were trained and onboard, nearly every CIO said they'd need a way to keep them from being lured away in the extremely competitive marketplace. "How about a cone of silence?" suggests Valentine, recalling the isolation device from *Get Smart*.

Can the CIO genie make better-trained employees materialize on our doorstep? And if they do, can the genie tell us how to keep them?

Reality Check Graduate schools are beginning to turn out students who have been well drilled in business strategy as well as in technology, says IBM's Horn, so the picture will start to look better for new hires in the next two years.

In the meantime, organizations should work to create a corporate culture that values knowledge sharing and knowledge management, Horn says. Such an environment keeps star workers happy by acknowledging individual contributions (shared, for example, over a personal intranet Web page accessible only by fellow employees) while giving all employees access to as much organizational knowledge as possible. Companies must begin now to explore a wide range of technologies—everything from smart mail routers to natural language processors to next-generation Web search engines—to ensure that employees have the resources they need as well as the means to screen out extraneous information.

Finally, Horn warns, "researchers and developers tend to be very deep, analytical people; they're not good strategic thinkers by training." To get engineers thinking outside the box at IBM, the company sponsors (and recommends to its clients) jam sessions—essentially large, organized brainstorming activities that expose employees to points of view from other disciplines within the organization.

Tracy Mayor is a freelance writer and editor based in Beverly, Mass. She can be reached at tmayor@shore.net. *Senior Writer Perry Glasser contributed to this report.*

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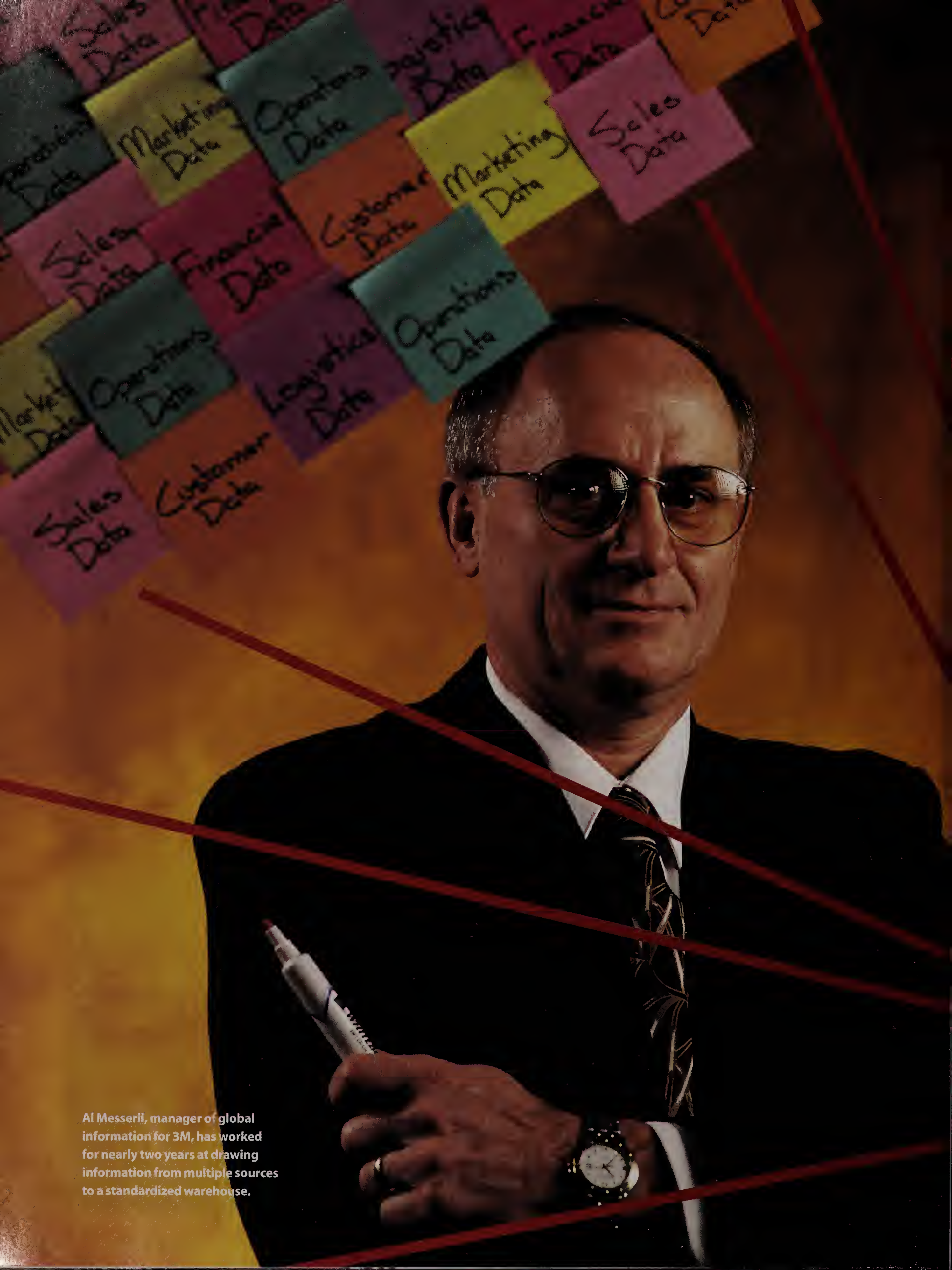

Al Messerli, manager of global information for 3M, has worked for nearly two years at drawing information from multiple sources to a standardized warehouse.

PHOTO BY STEVE WOIT

the middle GROUND

Will dependent data marts strike a balance between huge data warehouse rollouts and piecemeal data mart implementations?

BY CHRISTOPHER KOCH

THE INVOICE IS ONE OF THE MOST ELEMENTARY UNITS OF information in a company. It is the protozoan in the information food chain, the single-celled organism that can't get any smaller. Name, address, item, price, date, amount paid...it just doesn't get any lower on the ol' corporate hard drive.

Massing these invoices together into a primordial swamp of information is the theory behind the data warehouse. The ooze of invoices becomes the basis for all the analytical information the company produces, the base numbers from which all calculations are derived. Staffers can analyze the company at the lowest level of specificity and the highest level of abstraction, gaining powerful new insights into customer habits, developing new products and selling more of them. All of which makes CEOs spontaneously yell, "Cha-ching!"

The promises of data warehousing are so sweet that in 1997, according to a survey by Meta Group Inc., a Stamford, Conn.-based consultancy, companies spent

Reader ROI

READ THIS STORY TO LEARN

- How to avoid data warehouse project failure
- The best ways to create an enterprise data warehouse strategy
- Team structures for creating and supporting a data warehouse

an average of $1.9 million on data warehousing projects. But the reality of data warehousing is much more risky and difficult than the promise. Those big bucks are being poured into projects involving unprecedented levels of technical difficulty and painful organizational change. Another report from Meta Group says that 50 percent of these multimillion-dollar projects fail to meet the desired levels of success among the IS groups charged with combining all the ooze. And although few companies actually abandon data warehousing after an initial failure, many CIOs and IT project managers report failed first and sometimes even second attempts at creating a successful data warehouse.

Though data warehousing has been around for 10 years, the reasons for these multiple failures are only now beginning to be widely understood. Experience has shown that size really does matter to data warehousing success. Companies that build a single vast collection of data find these multiterabyte databases are expensive, difficult to build and maintain and can quickly overwhelm a company's network and technology infrastructure. Meanwhile, the small-scale, narrowly focused databases (a.k.a. data marts) pose a much more insidious threat. They have emerged as the quicker and ostensibly cheaper alternatives to data warehouses, costing as much as 80 percent

The only constants CIOs can count on are that data warehousing will become more difficult and consume more IT resources.

Beat 'Em and Join 'Em

Different teaming strategies enlist aid and support across the company, but the goal is always the same: head off potential resistance through involvement

AT THE PRUDENTIAL INSURance Co. of America, which has a decentralized business and IS structure, Pat Komar, vice president of information systems at the Newark, N.J.-based company, developed a data group made up of representatives from the six different IS units in the company, each of which serves a product line business unit. "Most of the data reps in the different divisions had never met each other before this began," says Komar. "That's how decentralized we were."

The data reps from the different IS groups within Prudential were charged with moving data from old computer systems to the centralized warehouse. They had to enlist "power users" in their business units to prioritize the specific information needs of the users and define unit-specific data. The combined teams of data reps and power users worked together to mold a company standard for such issues as data definitions, data consistency and technology infrastructure. The team also decided on the rules for building new data marts so that the marts fit into these guidelines while still letting the different units get at the specific information they needed.

At State Farm Insurance Cos., a technical group and a business group meet at least once a month, according to Scott Hartema, staff director of the systems department at the Bloomington, Ill.-based company. Data mart project teams also send representatives to the meeting to report on project status and raise any relevant problems or issues for group discussion. The group structure puts pressure on the various business representatives to enlist support and cooperation from their home bases because the central teams make decisions that will greatly influence people's ability to access and analyze important information locally. "These people recognize that they have responsibility to get buy-in from their own groups and from the data warehouse group," says Hartema. "Negotiating [data definitions] can be a tough process." Meanwhile, the group structure helps IT focus on whether its work on building the data warehouse and the various data marts is not only visible but understood.

Sometimes IS has the advantage of high-level executive support for an enterprise data warehouse strategy right from the beginning and can take time to plan. Al Messerli, manager of global information management for St. Paul, Minn.-based 3M Corp., was able to spend a year and a half researching and preparing an enterprise plan in parallel with 3M's broader effort to create "one face, one voice." During the course of the research effort, he created three teams that fanned out across 3M's many business units and geographic locations. The data research team interviewed hundreds of potential data warehouse users to under-less than a data warehouse, according to GartnerGroup Inc., a Stamford, Conn.-based research and consulting company. But data marts, usually built to accommodate the information needs of a particular division or function—finance, for example—present no incentives to share information with the rest of the company and can lead to a chaos of incompatible technologies, duplicate data and an overwhelming demand for system maintenance. "You don't notice there's a problem until the problems are manifest," says Bill Inmon, chief technical officer at Pine Cone Systems Inc., a data warehouse software company based in Englewood, Colo. "It's not until you build the third or fourth data mart that you see the problems with integrating data and with maintaining adequate IT support."

IS must take the blame and do the cleanup when either of these extremes goes awry because so much of the budget goes toward the technical details. According to a Meta Group survey of its clients, 60 percent to 80 percent of a data warehouse project budget is spent on processing data, rooting it from legacy systems, correcting it, converting it into a readable format and treating a usable, accurate collection of info ooze. Worse than the expense, IS alone cannot perform these tasks. Because no one can afford to spend money on data that has no direct relevance to the key business processes of the company, the business must help ferret out the data and define it within the data warehouse. With so much money being thrown at a complex, abstract effort and the large time commitments required from the business's best and brightest, CIOs have a lot to lose by managing one of these projects.

stand their needs and requirements. The global data standardization team brought together IS representatives to develop and implement standardized data formats and transform procedures to create consistent, integrated data in the data warehouse. The third team was entrusted with benchmarking the different hardware and software platforms available from vendors. "We tested five major database platforms and scaled from 1 to 200 concurrent users," says Messerli. "That separated the wheat from the chaff pretty quickly."

With 3M's global workforce, people needed to be able to access the data warehouse from anywhere. Any platform that couldn't work with a Web browser was crossed off the list as was any platform unable to support access from 30,000 people. "If we had gone into this on a small scale, we would not have succeeded," says Messerli. "If we had gone in and started doing pilots or data marts without thinking about all these elements, we would have failed the first time we tried to do something with many users concurrently or with people who needed remote access. You have to think about these sorts of things before you get in too deep."

–C. Koch

Pat Komar, vice president of information systems at Prudential Insurance, brought together power users and data reps to create standards for a centralized data warehouse.

PHOTO BY CHRIS CASABURI

The only way to prevent costly "do overs" in data warehousing is by putting together a strategy that balances the business's anxiousness to access valuable data with IS's need to create a stable database infrastructure that can be shared across the company and can be supported by something less than an army of database technologists.

Although approaches to creating such a strategy are all over the map, a hybrid emerges that combines a central data warehouse (to reduce IS's support nightmare) with many smaller data marts that pull data through the data warehouse so that everyone uses identically formatted data in their calculations. Known as dependent data marts, the approach can mean less chaos for IS and faster, more focused access to data for the business.

Sharing Is Hard

In 1995 3M Corp. built an enterprise strategy for data warehousing to go along with its plan to present "one face, one voice" to customers. Though 3M has long had a strong centralized corporate IS group, "we had the equivalent of independent data marts for 25 years," says Al Messerli, manager of global information management for the St. Paul, Minn.-based maker of chemicals and office products. According to Messerli, "The business units and geographies were very independent, and they had their own decision support systems. All those different databases had different definitions of data. Three or four years ago we realized that this worked as long as you had autonomous units but not if you wanted to begin sharing data about customers, products and markets across the company."

Before he began building the company's new data warehouse architecture, Messerli spent a year and a half researching dozens of data stores and lining up support among the different "data owners" in 3M's many business units. But old habits die hard in a company with as many fiercely independent business units as 3M. Despite strong support from 3M's executive staff, "the honest truth," says Messerli, "is we're still dealing with the pride-of-data-ownership issues in the different business units. We won't be done integrating the data warehouse until late 1999."

Messerli's team is working to root out the "thousands" of home-grown applications that exist around the company and tie them to the data warehouse. He is doing so quietly and gently. "There are large numbers of people in the business unit support groups that built and maintained their own decision-support applications, and now we are asking them to depend on others for some of those applications," he says. "In many cases, they've been doing it their way for 25 years, so I would call that a major cultural change."

> **Is a customer** someone who walks through the front door or someone who actually spends money?

Leading Industries for Data Warehousing

According to Meta Group Inc., in 1997 companies invested as much as 19 percent of their total IT budgets on data warehousing investments. Industry leaders were

- **Telecommunications**
- **Health care**
- **Petrochemicals**
- **Banking**

Messerli says these local data czars will see some compromises in their applications and in overall performance, but they are also beginning to see the many advantages of being able to access data from all areas of the company. For example, the first implementation of the global data warehouse in 1997 focused on replacing 3M's U.S. sales reporting and order history databases and was fed with data from the nascent (and only partially full) data warehouse as proof of the new centralized concept. "The first step in convincing people to give up their own systems and go to the shared data warehouse was proving we can deliver," he says.

Data Marts Will Overwhelm IT

State Farm Insurance Cos. discovered the hard way that its data marts couldn't exist independently without some kind of enterprise-linking strategy. After building a 3.8-terabyte data mart in 1996 for its actuarial group to help it more quickly calculate insurance rates, State Farm's data management group was besieged by requests from other departments that wanted to access the actuarial database—requests that could not be fulfilled. "The actuarial data mart was designed to handle large amounts of data rather than many users," says Scott Hartema, staff director of the State Farm systems department at the Bloomington, Ill.-based company. "It was designed to be a departmental system."

But Hartema realized that if State Farm kept building data marts this way—department by department, each pulling data directly out of many different operational systems and each customizing the content and definitions for its particular users—his IS group would have an integration nightmare on its hands. And the business would have conflicting, inconsistent data flowing from those myriad data marts.

"With a well-focused, short-term project scope, you can show ROI quickly [with a data mart]," says Hartema. "It's hard to say to business managers, 'Do the big picture first,' because they get what they want from a data mart. Marketing can put one of these things up in three months, and it's tough to say that's a bad decision. But there are issues of data quality and consistency that cannot be addressed at the departmental level."

For example, if each data mart has a different way of describing a customer, which one is correct? Is a customer someone who walks through the front door or someone who actually spends money? "If there's a top-down effort to [decide one code for everyone], it may

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add three to six months to the project. But that's time well spent for the long term," Hartema says.

Cost studies of data mart strategies seem to agree with Hartema. To build six independent data marts, each with a distinct set of applications and the extra storage required for those applications, costs $1.4 million in initial acquisition costs and $1.4 million in annual maintenance for the set. But it costs only $560,000 in acquisition and $761,000 in maintenance to build six dependent data marts that link to a central data warehouse, according to Pine Cone Systems' Inmon.

> Once business people get access to the data warehouse, watch out for the avalanche of requests.

Data About Data Is Vital

Metadata is the information about the information contained in the data warehouse. It answers questions like, What system does this data come from? When was it last updated? How is a particular category of data, like "customer," defined in the database? Having many independent data marts across the company makes it difficult for new users (and IS, for that matter) to understand what the developers had in mind when they built the database and what data is contained inside. Having an enterprise plan for developing, installing and describing data marts gives IS and users the chance to create a single set of "assembly instructions" that everyone can read and understand.

Enterprise Strategies Require Quick Payback

Beginning in 1991, State Farm's Hartema spent 18 months researching an enterprise data model designed to first define all the types of data available, second, show how to pull the data out of various old computer systems to make it consistent and third, demonstrate how to pool data in a data warehouse.

But State Farm's business unit chiefs sent him back to the drawing board. "As soon as we got out of the research mode, we encountered immediate resistance," says Hartema. "The problem was the amount of time people in the LOBs saw they'd have to invest in the effort, and they couldn't see the business benefit."

Hartema and his team realized that they could not afford to put the business on hold while they pooled all the data the company would ever need. If Hartema and his team were going to get business support for an enterprise data sharing strategy, the business people were going to need access to at least some reasonable chunks of data during each phase of the project.

So Hartema is now building a data mart for the State Farm marketing group that includes policy information (name, address and so on) approved by all the departments within the company. Data for the mart will be coming from his nascent warehouse. This way, marketing gets quicker payback for its investment and Hartema gets new building blocks for the big data warehouse to come.

Enlist Information Czars

Every company has business people who are obsessed with data and ways to slice it for new insights. In the old days of mainframes, they were the people who used to hang around the data center waiting for reports. Today they may well be running their own secret databases to serve their division or function, and they know lots about how people in the company use and share data. IS usually doesn't have their kind of knowledge. That's why it is critical to enlist these people as "data owners" to act as advocates and teachers within their business departments. At 3M, these people were easy for Messerli to spot. "The advantage of the old independent business unit structure was that each unit had people who did this stuff," he says. "So we got them to be on the core user team when we started the data warehouse project. How are you going to get them to accept it in the first place—they have to be part of it, right?"

Data Warehouses Require Constant Maintenance

Once business people get access to the data warehouse, watch out for the avalanche of requests. "As people start using [a warehouse], creative thinking starts to explode. I thought it would take people some time to adapt to the new technology," Hartema says.

But IS quickly discovers that there are trade-offs in terms of storage costs and access performance that come from adding new columns to the tables in the data warehouse. "We've gone through the data warehouse four or five times already to get rid of stuff that people don't use and use that space to add attributes that they will use," says Duane McKinley, director of information warehouse services for PCS Health Systems Inc., a drug benefit management company based in Scottsdale, Ariz.

As companies recognize the need to develop a strategy for sharing information across the company, CIOs start feeling more lonely. There is no "technology" or packaged software available to do the job. CIOs have to do much of the strategic work of data warehousing on their own or with consultants. The only constants CIOs can count on are that data warehousing will become more difficult and consume more IT resources. The number of data warehouses projecting more than 500 users jumped to 28 percent in 1997 from 6 percent in 1996, according to a Meta Group survey. Fragmented, departmental or divisional strategies for creating data warehouses and data marts will not survive this kind of surge in demand. IS must minimize duplication of effort through centralized, repeatable processes that do not create bureaucratic delays in getting the business the information it needs. The strategic challenge is huge but will only get bigger the longer IS waits. "You have to think big, plan big, then start small and deliver quickly," says Messerli. "That's not easy."

Senior Editor Christopher Koch can be reached at ckoch@cio.com.

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Edited by Howard Baldwin

Making Expenses Less Expensive

Expense management packages can turn administrative pain into financial gain

BY BILL ROBERTS

ILLUSTRATION BY ANDY POWELL

MERRILL LYNCH & CO.'S INVESTMENT banking division, which underwrites public stock offerings, found itself needlessly shelling out millions of dollars each year on travel and entertainment (T&E) expenses that it could have charged back to clients. Why? Because its parent's accounts payable department couldn't always process the division's expenses within the 90 days allowed by federal regulations.

It couldn't, that is, until early 1997, when it replaced paper expense reports with expense management software that automates the filing, payment, storage and auditing of T&E expenses. The advantages have been remarkable. "So far we've been able to increase the amount of our T&E expenses charged to clients by $5 million," says Heidi Evenson, vice president of business technology for the New York City-based division. And that's with only 1,000 traveling employees in two divisions.

Merrill Lynch's problem might be more costly than most, but other companies are also saving time, money and effort by using expense management software from a handful of small companies that aren't well known yet. The users say these products bring calm to a previously chaotic paper process.

IN THIS SECTION

- Quantum Computers
- Testing Web Applications
- Palm Talk
- Call Center Scheduling
- Euro Conversion

"It took the frenzy out of the T&E reporting and reimbursement process," says Ron Davis, vice president of information systems for Fujitsu Computer Products of America in San Jose, Calif. Among Fujitsu's 800 employees, only the 300 who travel the most use the software. Yet the company already saves 600 hours of management time it spent each year approving expense reports. It also saves as much as $100,000 a year in travel costs because it now has the information to negotiate better deals with travel vendors.

Other companies offer similar examples: If it had not installed expense management software, Incyte Pharmaceuticals Inc. in Palo Alto, Calif., would have needed to hire an additional clerk to handle expenses for the biotech startup, whose workforce had doubled to 700 in a year. Cleveland-based Reltec Corp., a telecommunications systems and services provider, cut its expense cycle time from three weeks to one in a pilot test and plans to roll out the system to its 500 workers who travel most.

These companies, among others, report that it now costs no more than $10 to process an expense report, compared with an average cost of $36 for processing by hand, as calculated in a 1997 American Express Consulting Services study.

Obvious Benefits, Slow Adoption

"It is straightforward to see the benefits," says Jim Holincheck, an analyst with Giga Information Group Inc. in Chicago. But he says the products aren't prevalent. Even most companies that have installed new accounting or enterprise resource planning (ERP) systems still process expenses by hand, Holincheck says.

Maybe that's because the developers aren't exactly household names. At 6 years old, Concur Technologies Inc. (formerly Portable Software Corp.) in Redmond, Wash., is the eldest and has by far the most customers and deployments—more than 150 worldwide. Between them, the others have fewer customers, although they include some big names like Ford Motor Co., which has decided to use Bothell, Wash.-based Captura Software Inc.'s Employee Payables product for salaried employees worldwide. Merrill Lynch also uses Captura's product. Fujitsu uses Concur's Xpense Management Solution, and Incyte and Reltec use Expense Reports from Emeryville, Calif.-based Extensity Inc.

Several other vendors hope to play in this space, including Ariba Technologies Inc. of Sunnyvale, Calif., which shipped a T&E module for its Operating Resource Management System in September 1998. Established business applications developers, such as Oracle Corp. and PeopleSoft Inc., already have T&E modules or expect to ship them.

Brian McDonough, a research analyst at International Data Corp., a sister company to CIO Communications Inc. in Framingham, Mass., says Captura, Concur and Extensity appear to be the most widely used.

Holincheck says it makes sense to check out PeopleSoft's expense module first if you're already a PeopleSoft customer. However, he says the core technology in expense management software is the rules engine, and the best rules engines he's seen so far come from the companies dedicated to expense management software.

Holincheck recommends you look at Concur's Xpense Management Solution first because of the company's maturity and customer base. If you're committed to Java, you might start with Extensity's Expense Reports, written entirely in Java. The Captura product's strength, he says, is a rules engine that can scale to high-volume transactions yet easily allows rules changes. There's little difference in

Speed Demons

Futuristic processors may be faster than we've ever dreamed

IMAGINE STORING MEGABYTES of information not on your hard drive, not on a floppy, but on an atom. Imagine a voice recognition system that works as fast as the brain thinks. If that seems unlikely, then imagine being able to detect exactly when and where your information system is under attack by hackers. Those are just a few advantages for CIOs that quantum computers (QCs) of the future will have over today's digital processors.

QUANTUM COMPUTERS

ILLUSTRATION BY ANDY POWELL

The fundamental difference between QCs and digital machines is that, while digital computers operate on a binary system of bits encoded as a string of zeros and ones, QCs use qubits, a measurement based on molecules, atoms, electrons or even particles of light to function as the brain. Unlike bits, which can exist only in a state of either zero or one, qubits are subject to a phenomenon known as superposition, allowing them to exist in multiple states as both zero and one or somewhere in between. In this manner, QCs can perform several parallel operations simultaneously, thereby exponentially increasing their speed.

According to Raymond Laflamme, a technical staff member at Los Alamos National Laboratory in New Mexico, quantum computing is inevitable, noting that the size and speed of traditional computers will eventually be limited by the number of transistors that can fit on a tiny chip. Because QCs operate at the atomic level, they do not face the physical limitations that silicon chips do.

"I don't know of an industry that in the long term doesn't need to increase its processing power," proclaims Nick Gall, vice president and service director of Meta Group Inc.'s Open Computing and Server Strategies service in Westborough, Mass., citing just one of the many advances that quantum computing will bring. He also predicts that QCs will have a huge impact on increasing network capacity by processing higher bandwidths. Yet he also acknowledges that QCs are a distant star in the sky.

"We've been talking about optical and quantum computing for at least 10 years now, and it is still 10 years away," Gall says. Others familiar with the QC effort believe that they will be useful only after years of work have ironed out such difficulties as its design and its ability to stand up to its environment and after scientists have established a new set of computational algorithms.

Laflamme recalls a prediction that he says appeared in the March 1949 issue of *Popular Mechanics* that computers of the future would have only 1,000 vacuum tubes and would weigh only one-and-a-half tons. In 50 years the industry has far surpassed that margin not only in terms of size but also in terms of application. If the industry is proceeding beyond this rate with the digital medium, then the advancements brought about through qubits will likely proceed at quantum speed.

–*Meridith Levinson*

Emerging Technology

price among these: typically $250 per seat in small quantities down to $50 or less for very large installments.

Mimicking the Paper-Based System

Features don't vary much either. The software typically includes a user interface that resembles a paper expense report, a database to hold filed reports, and business rules and workflow engines that can be programmed by your IT staff. The available packages all link into ERP systems and legacy accounting systems. They also offer other benefits such as direct payment to credit card companies for better cash management.

Here's how they typically work. An employee fills out an electronic form either from a PC-based client or through a browser at an internal Web site. The packages have prompts to make sure the employee provides all the information needed. The employee submits the electronic form, and it is routed wherever the business rules dictate. The software can be programmed to issue red flags for exceptions to company policy. Some companies choose to bypass the supervisor's sign-off and route forms straight to accounting, where only exceptions are reviewed—expenses that are over set limits, for example.

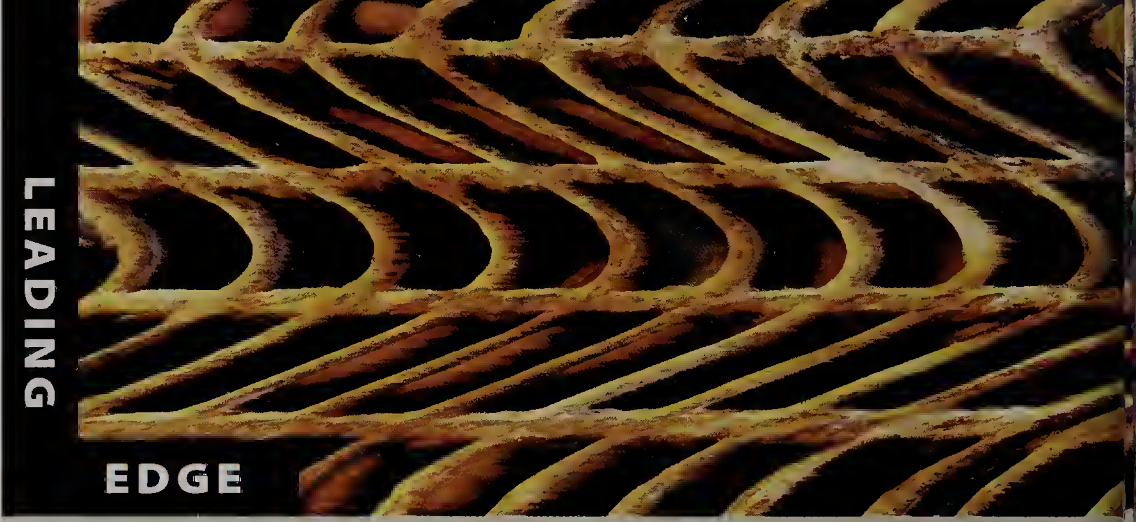
The electronic form gives the employee a tracking number. The employee stuffs receipts into an envelope, puts the tracking number on the outside and then sends it along via office mail to accounting. Some companies scan the receipts into databases, using the tracking number for easy access later.

Fujitsu is still on the PC version of Xpense Management Solution, according to Davis. "A Web-based version wasn't available when we selected Concur, but we probably wouldn't have pushed for a Web-based solution because our heavy travelers have to be able to work offline with a laptop," says Davis. Once Fujitsu moves to the Web version, which the company probably will do, they'll let the most-traveled road warriors use the client software when they're offline and have others access the software through the Web browser.

Extensity's Expense Reports offers an interesting solution to the problem of the disconnected worker. The same Java code comprises both a Web applet and a client application. The first time a user logs on, Extensity downloads the Java code to the PC. In the future, the user can either fill out the electronic form and submit it while connected to the intranet or use the Java application in disconnected mode first. When the user links to Extensity, the server first determines if the application on the desktop is the most current and transparently updates it if necessary, prompting the user of any changes that this might require.

Many Side Benefits

The more employees you have using the software, the greater the benefit, Giga's Holincheck says. This might



Testing, Testing

BEFORE YOU DEPLOY A WEB-BASED APPLICATION, DO YOU have any idea how it's going to perform over your network? And what if it's linked to your database or your ERP system? What kind of effect will the new application have? Guessing and supposing are bad ideas in this situation. Rational Software Corp. in Cupertino, Calif., has created a testing tool called **PerformanceStudio** that is specifically designed to test the system performance of applications running on Web servers (from Netscape Communications Corp., Microsoft Corp., Apache Group or Sun Microsystems Inc. and others) linked with ERP systems (from SAP AG, PeopleSoft Inc. and Oracle Corp.) or database servers (from Oracle, Sybase Inc. and Microsoft) or even BEA Systems Inc.'s Tuxedo transaction monitor.

PerformanceStudio incorporates a variety of test scripts designed to test load balancing on the network, the client and the server. Users can mix and match workloads to simulate a typical business process and then capture the data for later analysis. Users of Rational's testing products—PreVue, SQA Suite (Load Test Edition) or Performix—who have current maintenance contracts will receive free upgrades to PerformanceStudio. Pricing starts at $10,000 for Web server testing and $30,000 for database server testing. For more information, call 800 728-1212 or visit *www.rational.com.*

Talk to the Handheld

THE HAND MAY BE QUICKER THAN THE EYE, BUT THE MOUTH is quicker than the hand. If you want to make a quick note to yourself, it's probably faster to speak it than to write it. But no one wants to carry both a Palm Computer and a dictaphone, so DynaFirm Inc. in Los Alamos, N.M., has created **JetTalker** to turn the Palm Computer into a device for voice messages.

The same size and shape as a Palm Computer's modem, the JetTalker attaches to the bottom of the computer. Users click a button to start recording and then can organize voice messages into one of 15 categories; each category can be broken down into as many as 15 subgroups. The JetTalker can record up to 34 minutes of messages, which can be password-protected. Users can also set up the device to record and play personalized voice alarms. The JetTalker weighs 4.5 ounces, runs on two AAA batteries and costs $169. For more information, call 505 661-6044 or visit *www.dynafirm.com.*

Scheduling Skill

SO MANY PEOPLE, SO MANY WAYS TO SCHEDULE THEM. BLUE Pumpkin Software Inc., a developer of call-center staffing solutions located in Mountain View, Calif., has added two new products to its lineup: **PrimeTime Enterprise**, for scheduling agents across an entire enterprise, and **PrimeTime Skills**, for scheduling call-center agents with a variety of skills (its flagship product is PrimeTime F&S, for basic forecasting and scheduling).

PrimeTime Enterprise is designed to create workflow and manage workforces in complex situations; for instance, across multiple call centers, virtual call centers or those whose agents have highly flexible work schedules. It takes into account multiple tasks, goals, technology, time, location, customs and laws and provides a variety of scheduling and reporting tools as well as an open API to integrate the application with others in the enterprise.

PrimeTime Skills is designed to figure in agents' skills for scheduling, forecasting and reporting. It can develop queues for agents who speak multiple languages, are cross-skilled or who work in different groups. Pricing for PrimeTime Enterprise starts at $50,000 and is based on the number of agents or sites being scheduled. The PrimeTime Skills module can be added for $35,000. For more information, call 650 948-4998 or visit *www.blue-pumpkin.com.*

Your Euro Overhaul

THE CHALLENGE OF THE NEW EUROPEAN MONETARY UNIT, the euro, for multinational corporations is the initial triangulation involved—the ability to translate from one currency to the euro and into a third currency. It almost makes Y2K remediation, which is just one kind of conversion, look easy. Viasoft Inc. in Phoenix has created a version of its mainframe-based **Existing Systems Workbench, ESW for Euro**, for this conversion headache (mandated for completion in 2002, when all national currencies will be withdrawn in Europe).

ESW for Euro contains 10 modules, each targeting a specific facet of the process; users do not have to purchase all the modules, though. They include project estimating and impact analysis, application code change and transition management, dynamic currency translation and encapsulation, currency conversion for existing files and databases, management of currency conversion rules, debugging, regression testing and test-data generation. Pricing for ESW for Euro varies by platform (Windows, Unix and mainframe). Consulting and professional services for budgeting and conversion projects are also available. For more information, call 602 952-0050 or visit *www.viasoft.com.*

seem obvious, but few companies that have adopted these products have rolled them out to all workers. In some cases, just putting the sales force on the system was enough of a savings to justify the purchase. Other companies plan to roll out the software throughout their companies, but like any deployment it takes time.

Merrill Lynch, for example, expects to have another 1,000 employees in its investment banking and institutional sales divisions on Captura soon. Evenson says that when a Web version becomes available, she expects Merrill Lynch will roll out the software in all divisions to the company's 27,000 travelers because of the residual benefits expense management software provides. At Merrill Lynch, it assists with compliance in a highly regulated business. The automated form requires the employee to enter affiliations of individuals who were entertained in the course of business. The system automatically flags for a manager's preapproval any expenses connected with government officials. This helps Merrill Lynch avoid the embarrassment of overlooking dubious payments.

Many companies use expense management software to automate payments to corporate credit card providers. Telecom giant Sprint Corp. in Westwood, Kan., has roughly 50,000 employees using Concur's Xpense Management Solution on the corporate intranet. Workers used to apply for reimbursement from Sprint and write a personal check to the corporate credit card company. Now they never see the cash because it's paid directly and electronically to MasterCard, says Mike Egan, Sprint's director of employee disbursements.

Egan acknowledges it took some time for employees to get used to this. Sprint helped by conducting training for about 700 administrative assistants on the assumption they would be filing many of the reports for others and could also serve as a resource to anyone else using the new application.

As with any new application, expense management software will affect your workers in ways you cannot foresee. But if the experience at Sprint is any gauge, you're not going to face too many problems.

Sprint devised a careful plan to roll out Concur in two phases of 25,000 workers. The first phase was supposed to happen over three months. But nobody adhered to his careful scheduling, Egan says with a chuckle. The users were so jazzed by the idea of computerized expense reports that many of them jumped the gun. "We got a lot more workers on day one than we planned for. By the time we started the second phase of 25,000, we already had about 80 percent to 85 percent of the workforce on the system."

Bill Roberts, a freelance writer in Los Altos, Calif., covers business, management and technology. He can be reached at brobert1@ix.netcom.com.

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MAXIMIZING THE PAYOFF FROM I.T.

WearGuard's Sales-Force Automation System

Vital Statistics:

- **Organization:** WearGuard Corp., Norwell, Mass., a division of Aramark Corp.
- **Application:** Sales-force automation
- **Technologies:** Contact management software from GoldMine Software Corp. and a Novell Inc. network server
- **Scope:** 87 sales representatives in the business sales group
- **Sponsor:** Jim Skinner, director of WearGuard's business sales group, and Tom McDermott, vice president of sales
- **Objective:** To improve customer service and increase sales
- **Payoff:** Projected 12 percent increase in rep sales next year

A GROWING SALES FORCE THAT fails to tap into state-of-the-art technology will suffer missed opportunities, spotty information sharing and compromised customer service.

Until expanding its ranks last year, WearGuard Corp.'s business sales group put its faith in a manual system of shoe boxes filled with Post-it notes and index cards to track leads and customer information, says Barry Meltzer, project manager for application development at the Norwell, Mass.-based direct marketer of work-related clothing, including heavy-duty pants and jackets.

While BSG employees did have access to the company's Unix-based order-entry and customer service system via Windows-based clients, they didn't have the automated tools that could prompt them to follow up on old sales leads or maintain call histories of prospects. Instead they had to rely on their own homemade manual methods. As a result, when salespeople left the company, critical client histories often went with them. New sales representatives had to start from scratch—a waste of time considering that each sales rep tracks between 700 and 1,200 accounts from small to midsize businesses, according to Meltzer.

In late 1996 WearGuard realized the shoe boxes had outlived their usefulness. Company executives planned to expand BSG to concentrate more on the corporate clothing market and realized that a larger sales force would require an investment in sales-force automation (SFA) technology.

"In order for [the sales force] to grow, the sales reps needed better tools," says Joe Liberato, WearGuard's business development manager.

A task force that included Meltzer and Liberato hired Waltham, Mass.-based consultancy Success Automation in 1997 to help select an SFA vendor. BSG chose GoldMine contact management software from GoldMine Software Corp. of Pacific Palisades, Calif., because it had the features BSG needed and could be linked with minimal trouble to WearGuard's legacy Oracle Corp. database.

WearGuard tested the software on the task force and a group of six sales reps. The companywide rollout kicked off in June 1997 and took about four months. "The biggest challenge was getting everyone—even technophobes—to use the technology," Meltzer says, adding that a wide range of computer skills existed among WearGuard's employees.

The MIS group built a link from the company's master Oracle database to feed the GoldMine SFA application with customer data and also built a toggle between GoldMine and the order-entry system. An icon on each desktop connects users to customer information in the GoldMine database via a Novell Inc. network server. Information updates from Oracle to GoldMine run automatically each evening. A hot button on WearGuard's order-entry system can bring up customer contact and call-back information stored on GoldMine.

Using the new system, sales reps can now track all calls to customers who receive the company's catalog. The system provides customized screens for adding notes as well as a scheduling calendar so that sales reps no longer forget to make calls or randomly call contacts from their account lists.

In the future, WearGuard hopes to use the system to facilitate much more targeted selling. Reps will be trained to pull specific information from the system to help them sell on the fly. For example, if a blizzard hits a particular state, BSG can download all customer names from that area and immediately send sales information on subzero temperature work clothes.

Since implementing the system, customer service has improved, Liberato says. However, it's tough to gauge whether BSG's increase from 65,000 accounts last year to 80,000 this year is wholly due to the new system, considering that other factors—such as warm weather—can affect sales, Liberato says.

On average, BSG reps' projected sales quotas for next year are up 12 percent, Liberato says, adding that the expected jump is partly due to the new technology. For his part, Meltzer is more succinct about the SFA system's merits. "Is life better than it was before? The answer is yes."

Kim Girard is a freelance writer based in Somerville, Mass.

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